VOL. XXV. No. 9 SEPTEMBER 1940

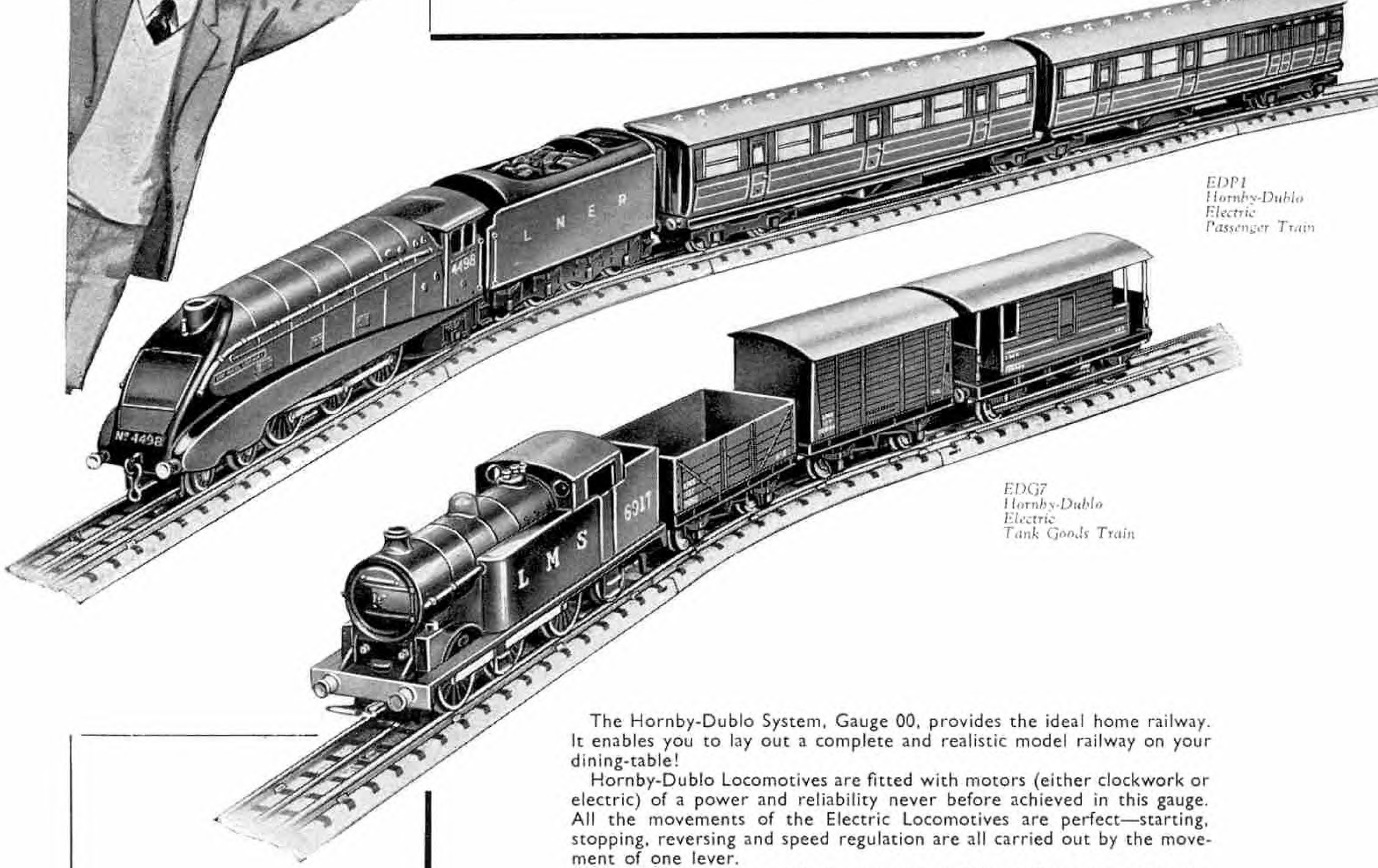
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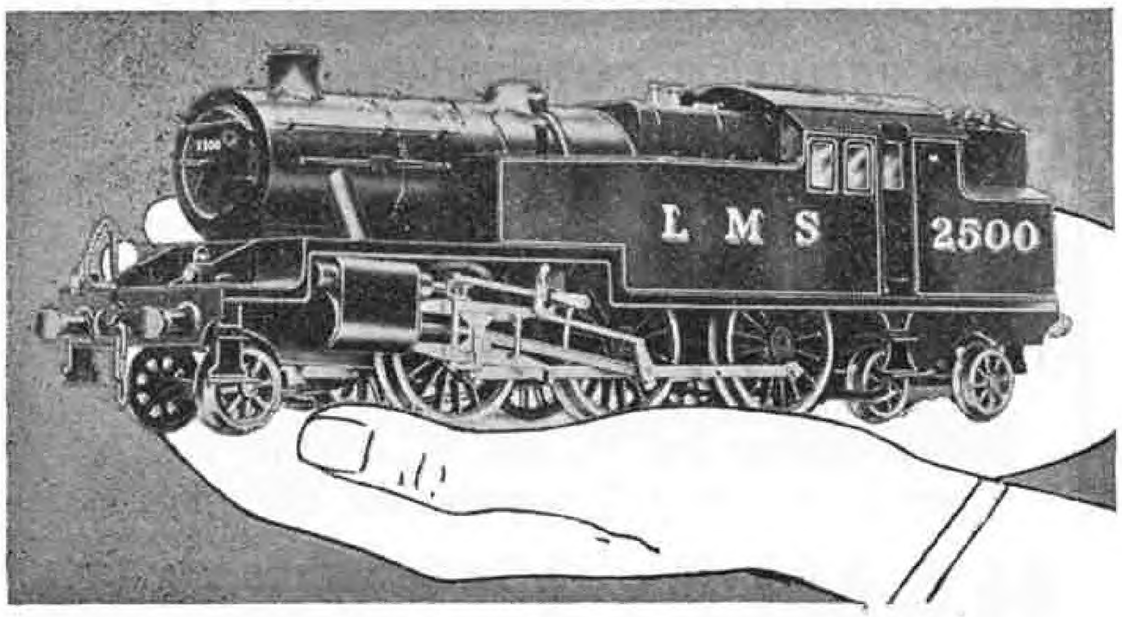


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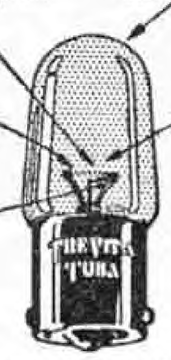
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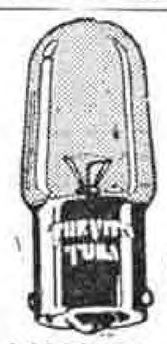
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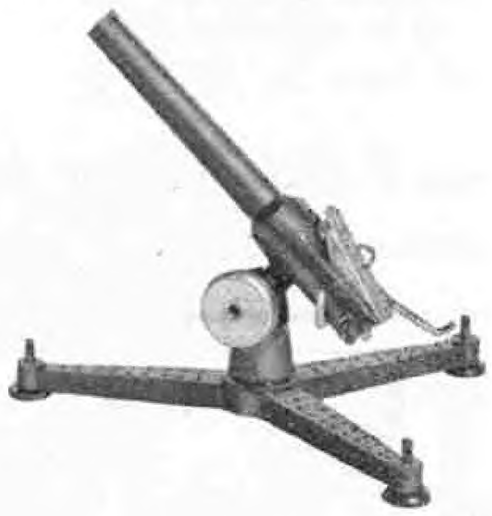
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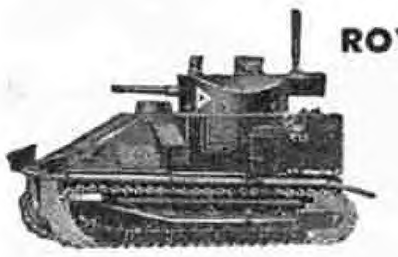

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151a



151d



150d



151c



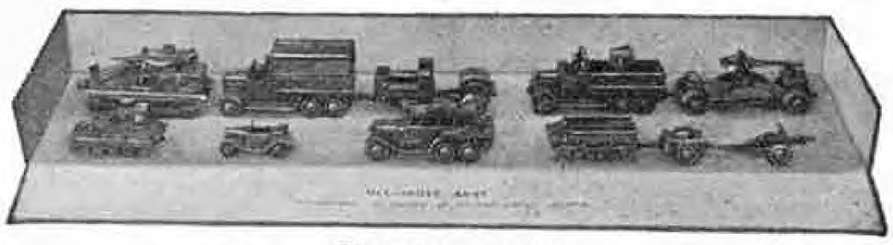
151b

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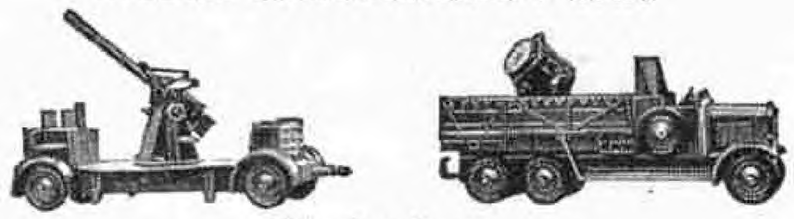
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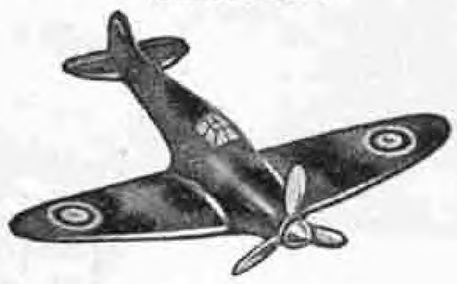
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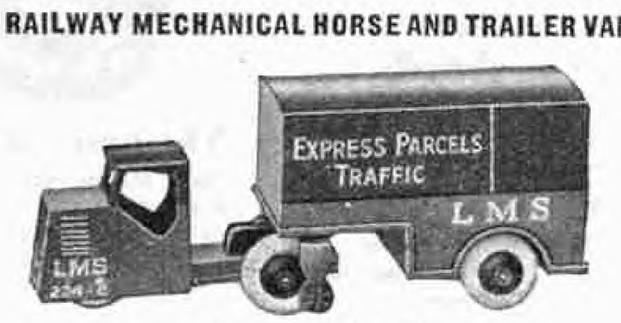


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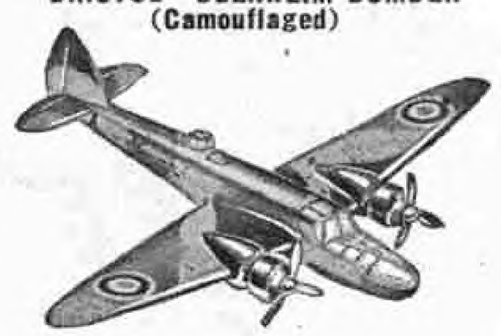


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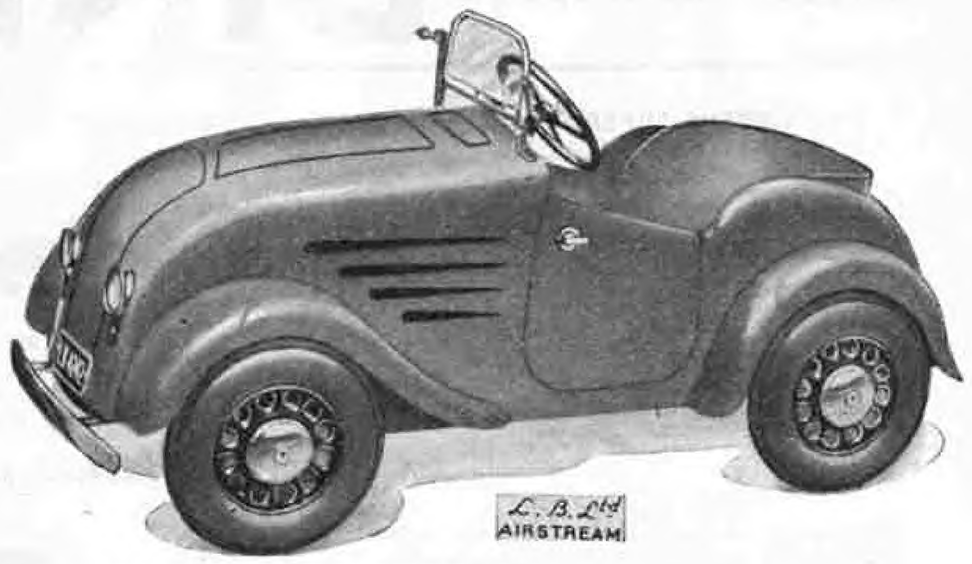
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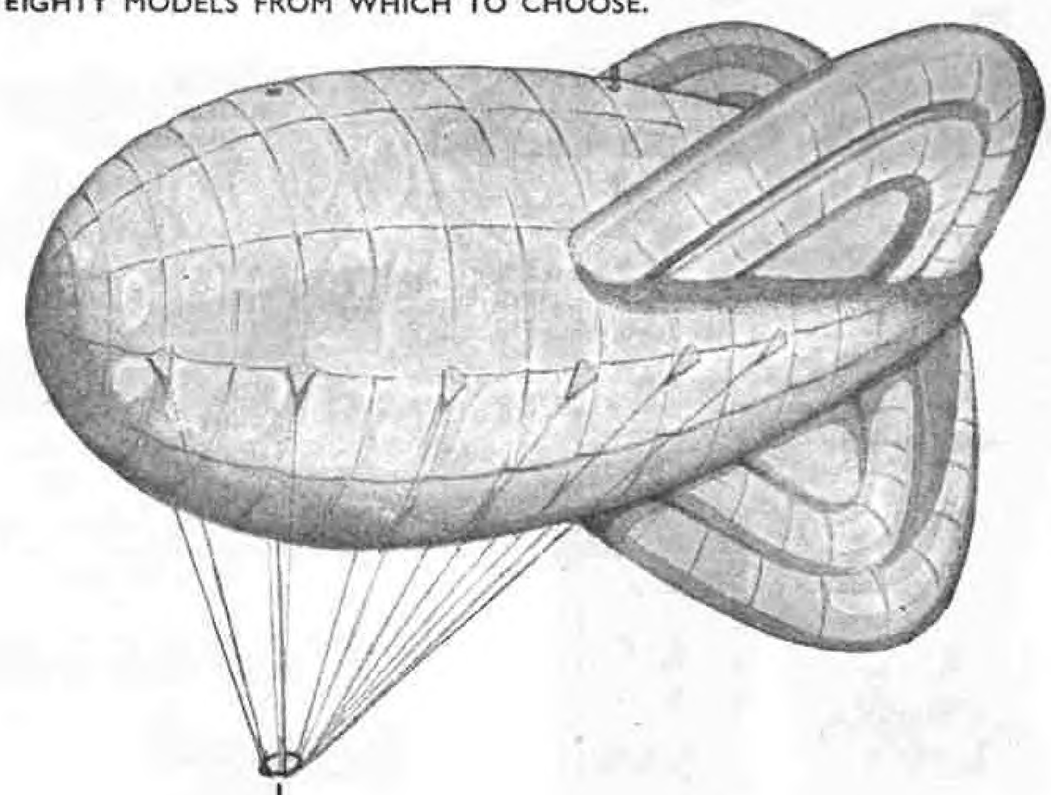
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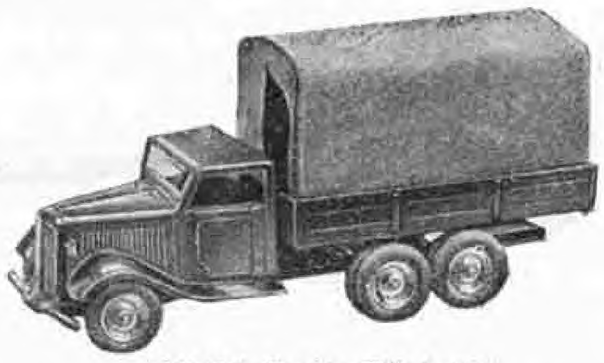
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Next Month: "TESTING AN AMERICAN WARPLANE." Publishing Date: 1st October

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England

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With the Editor

The Prime Minister

I reproduce this month a typical portrait of our great Prime Minister.

What a career Mr. Churchill has had! He was born in 1874, educated at Harrow and Sandhurst, and in 1895 joined the 4th Hussars. He saw service as a correspondent with the Spanish in the Cuban insurrection, and from then up to the end of the South African War he was in the thick of fighting somewhere or other. In 1897-8 he served on the Indian Frontier; in the latter year he went to Egypt and, attached to the 21st Lancers, took part in the Khartum campaign. When the Boer War broke out he went to South Africa as correspondent of the "*Morning Post.*" He was captured by the Boers and imprisoned at Pretoria, but a month later made a daring escape and after a thrilling journey reached Lorenzo Marques. From there he went to Capetown, joined the South African Light Horse as a Lieutenant, and was present at the battle of Spion Kop and the occupation of Pretoria.

After this round of warlike activity Mr. Churchill returned to England to begin a political career during which he has occupied a unique number of positions of Cabinet rank. When the Great War of 1914-18 broke out he was First Lord of the Admiralty, and it was very largely due to him that the Fleet was then in a splendid state of preparedness. Subsequently he was out of office for a while, and during this period he commanded the 6th Royal Scots Fusiliers in Belgium. In 1917 he became Minister of Munitions, and one of his greatest successes was the organisation of the construction of "Tanks." Subsequently he became Secretary for the Colonies, and Chancellor of the Exchequer.

In all these important posts Mr. Churchill showed the initiative, courage and driving power that are so characteristic of him; and now, in his greatest post of all, he is showing these qualities as never before. His words in his too few speeches send a thrill of encouragement and determination throughout Britain and the Empire, and indeed across the Atlantic to the American continent. His listeners are of a multitude of different types, yet somehow he seems to express the thoughts and feelings of every one of them. He represents as perhaps no man has ever done before the united heart of the British people.



The Prime Minister.

No call to action could be finer than that with which Mr. Churchill concluded his speech in the House of Commons on 18th June, after the collapse of France:

"Let us therefore do our duty and so bear ourselves that if the British Commonwealth and Empire lasts a thousand years men will still say: 'This was their finest hour'."

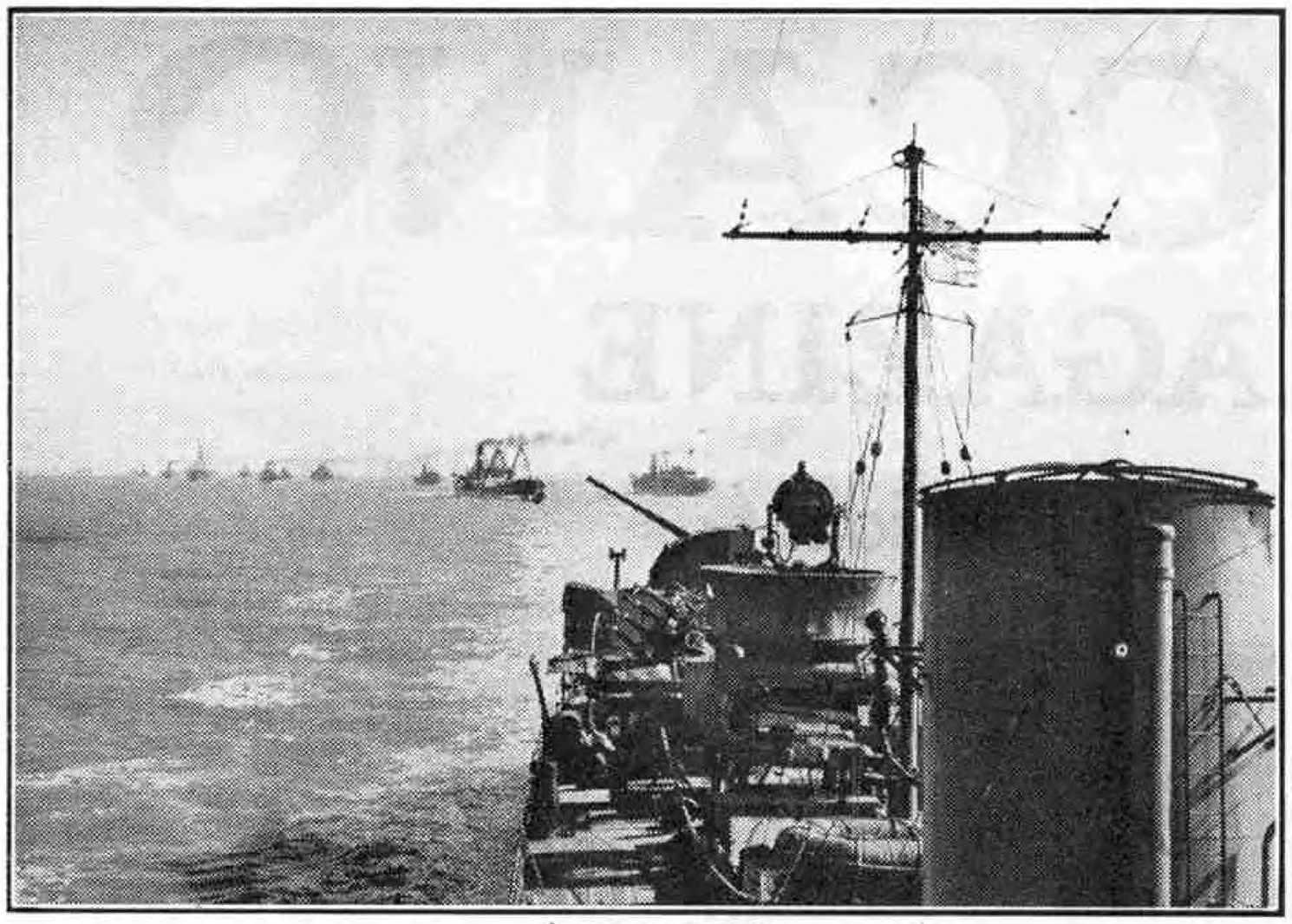
R.A.F. Fund Passes the £100 Mark

The magnificent exploits of the R.A.F. in recent weeks have cheered us all up wonderfully, and we are full of admiration for the men who have won fierce battles in the air or flown almost at will over Germany, as well as for the work of the splendidly efficient ground staffs. Their achievements have awakened new interest in our Radio Fund, which now totals well over £100.

This is the first milestone. Now I want to reach £150 quickly. I ask every reader to remember what the R.A.F. is doing for us and to send a contribution. Several readers have already repeated their contributions, the record so far being eight separate donations from a Leyland reader.

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I am still receiving appeals from readers who fail to obtain their copies of the "*M.M.*" The only way to avoid disappointment is to give a definite order to a dealer or newsagent. Readers who then do not receive their copies regularly should write to me.



A convoy in progress.

How Submarines are Hunted

By Commander H. Pursey, R.N.

THE most important feature of the first twelve months of the war at sea has been the British defeat of the German and Italian submarine menace. Several factors have contributed to this success, including the convoy system of shepherding merchant ships together, the defensive arming of such vessels, and our aircraft attack on U-boats; but the most significant is that, in contrast with the Great War, we now have an efficient submarine detection apparatus in the Asdics.

A year ago the Germans, remembering their experience in the Great War appreciated that in the event of hostilities against us Great Britain would again blockade Germany, and that it was blockade which brought down their vast military Colossus in 1918. Because of our greatly superior Navy, the Nazis realised that they could not adopt battle strategy and accept action with our Fleet, and hence their only possible hope was to attempt a counter-blockade.

The main objective of the Nazi naval war plan was therefore intensive attack on our overseas trade. This was to be carried out by surface raiders in the distant seas and submarines in the Atlantic and round our coasts, by mining of the sea highways—to the danger of belligerents and neutrals alike—and by aircraft attack on ships within reach of their aerodromes. As the use of raiders and aircraft must obviously be limited, Nazi attack on our seaborne trade fell mainly to their submarines, and the nefarious tactics of these vessels included not only the torpedoing of merchant ships—both cargo and passenger—but the scuttling and gunning of unarmed vessels, even harmless fishing craft and lightships, and the promiscuous laying of mines.

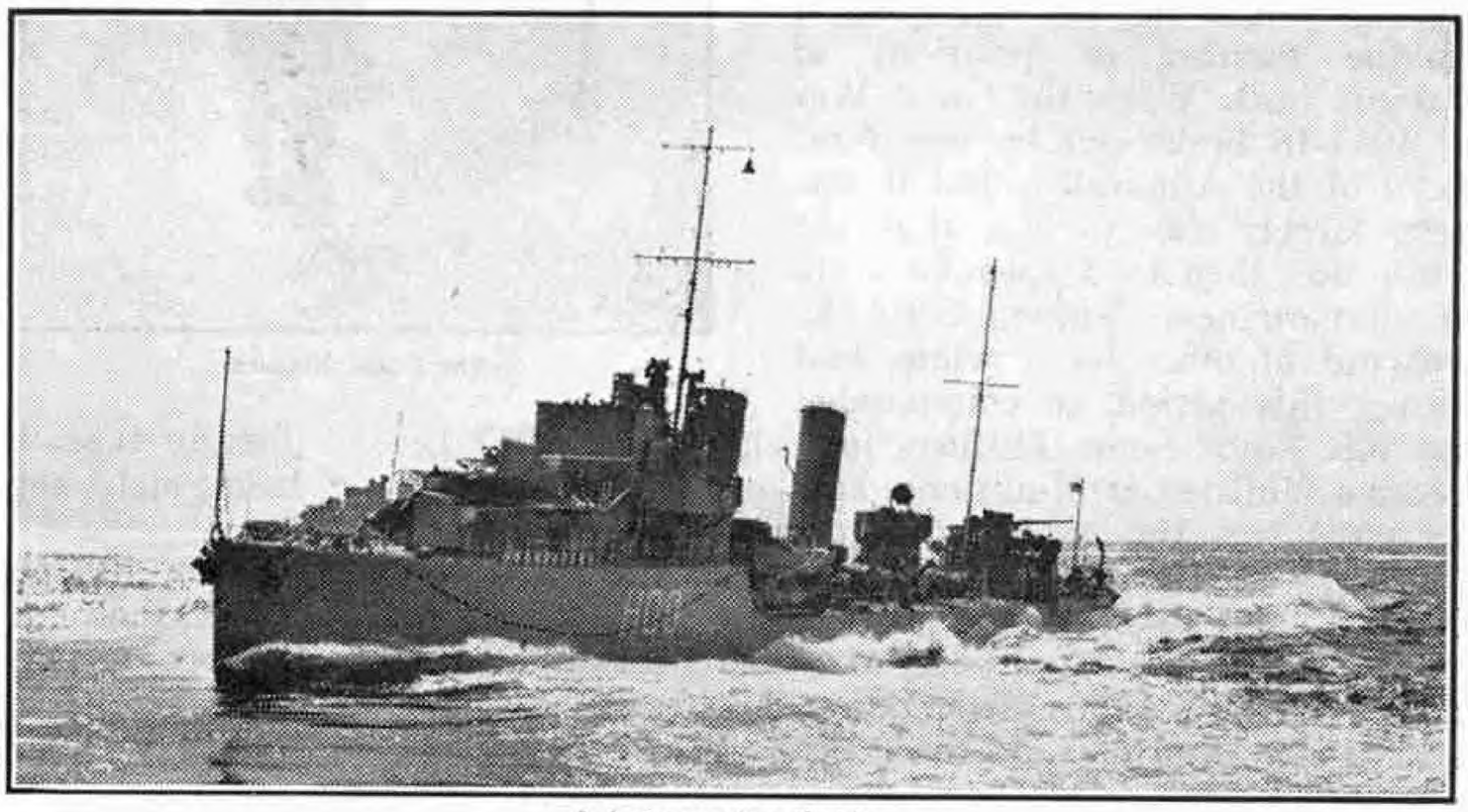
The mistaken theory of the German Naval High Command was that surface vessels, both war and merchantships, were particularly vulnerable to assault by submarines and aircraft—in fact that with concentrated attack from above and below the sea they could be driven off the ocean. As regards aircraft they were merely theorising, this weapon not having yet been tested in modern warfare; as regards submarines, they made the grave mistake of thinking in terms of the war of nearly a quarter of a century ago.

When in February 1917 the Germans announced their unrestricted U-boat campaign to sink all merchant ships in British waters on sight, we were not prepared for such arrant piracy and flagrant disregard of international law.

What the Nazis failed to appreciate was that whereas there had been no outstanding improvement in the design of submarines or the development of their weapons, during the twenty years since the Great War vast strides had been made in perfecting anti-submarine measures. Furthermore, instead of our being caught unprepared, plans were ready for an immediate and intensive attack on these underwater assassins.

* * *

For the greater part of the last war the hunting of U-boats was largely a matter of "blind man's buff." We had no satisfactory means of underwater detection and, unless a submarine disclosed her position by surfacing, "popping up" her periscope, or by the tell-tale track of a torpedo, her whereabouts remained unknown. Similarly, early in the war, no really efficient means of destruction existed, except by ramming or gunfire, even when it



A destroyer "hunting."

was thought that a submarine had been located.

I was serving in the Dover Patrol in March 1915, when the first U-boat to be sunk in the Straits was hunted. This submarine, U.8, was first sighted by a destroyer, the "*Viking*," at mid-day. An hour passed before another clue was given as to her position. A watching drifter then noticed that a net, fitted with indicator buoys, was for no apparent reason being dragged through the water.

Destroyers were by this time hunting in the vicinity, and when, probably owing to an effort to free herself from the net, the U-boat's periscope reappeared, the "*Viking*" towed her explosive sweep over what she considered to be the position of the submarine and exploded it. The attack, however, was unsuccessful.

Another four hours passed without any further clue until, at some distance, another destroyer, the "*Maori*," suddenly sighted a periscope. One of her hunting consorts, the "*Ghurka*," towed her sweep over the submarine and a violent explosion occurred. Soon afterwards the U-boat's stern shot up almost vertically, showing she was out of control.

The two destroyers then opened fire, and as soon as U.8 reached an even keel a man emerged from the conning tower, making frantic signs of surrender. As she sank, the crew of 25 were rescued by the destroyers' boats.

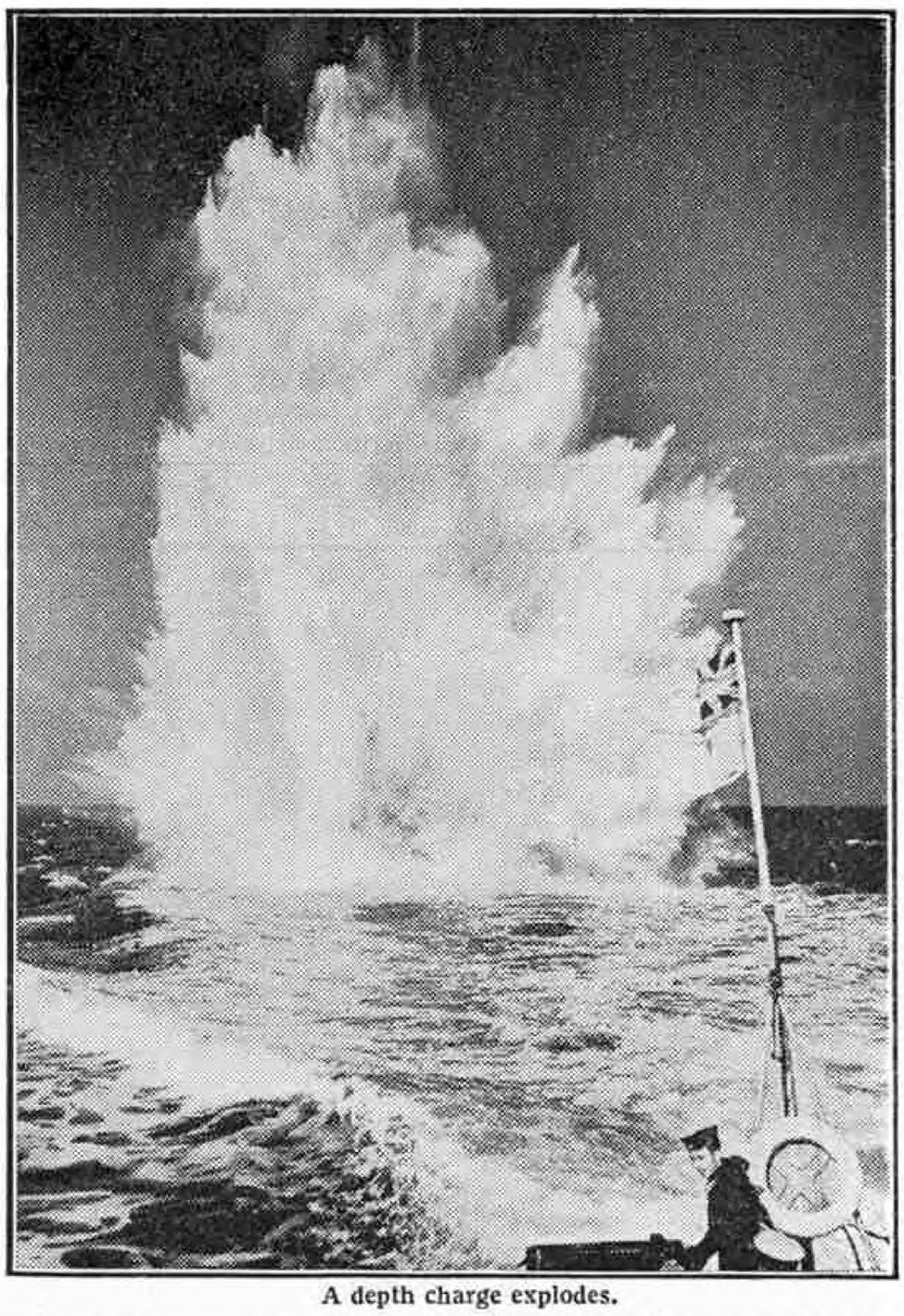
It was not until July 1916, or nearly two years after the outbreak of war, that the depth charge was first used with success. This weapon was to ring the death knell of the submarine, once accurately located; but an efficient detection instrument had yet to be evolved.

Fairly early in the war a plate hydrophone, which was simply an underwater telephone transmitter, was produced, but the hunting vessel had to stop to use it, and it gave no indication of direction. Later towed and directional hydrophones were developed, but their use depended on the emission of some sound from the submarine, either from the engines or elsewhere.

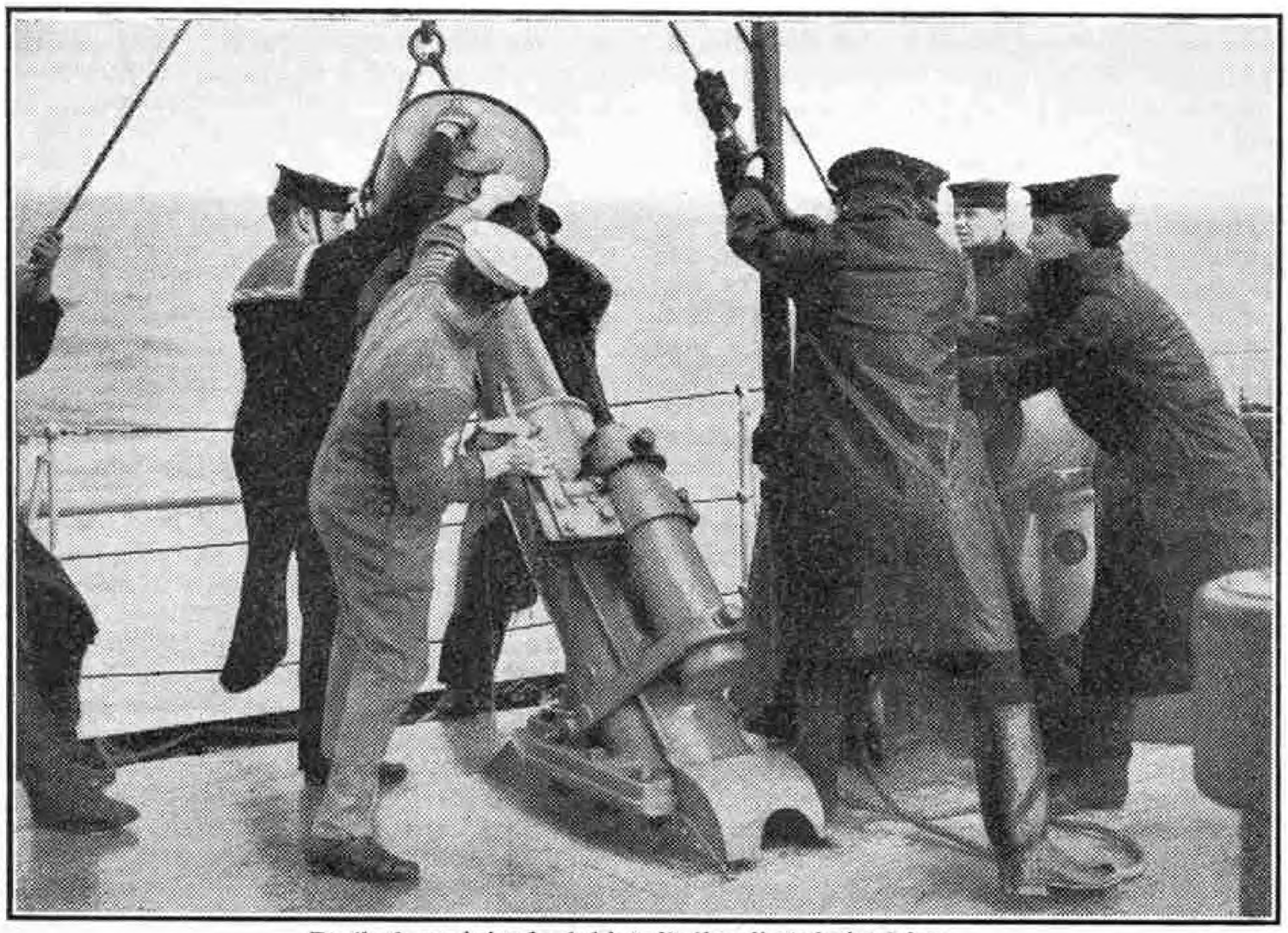
Despite the lack of really satisfactory apparatus, nearly 200 German submarines were destroyed during the last war, and two-thirds of these in two years—63 were lost in 1917 and 69 in 1918, an average of three a week.

* * *

The invention of a successful detection apparatus—the Asdics—has been the most important development in submarine warfare since the Great War, because, once a means of locating submerged submarines was found, secrecy, their greatest asset, was nullified. Opportunities for unsuspected attack were therefore reduced and the chances of their destruction considerably increased.



A depth charge explodes.



Depth charge being loaded into its "gun" ready for firing.

Various methods were tested and developed by the Anti-Submarine Investigation Committee—the initials of which, as with other Service matters, have provided the name, originally selected to preserve secrecy.

On joining the Anti-Submarine Flotilla, I was able to gauge the advance made in the original method of detection. Not only was the screen of the battle-fleet or convoy able to detect a submarine before she attacked, but we were able to locate other submarines which had given no clue of their whereabouts.

"Deep dive hunts" were carried out, which entailed finding a submerged submarine and hunting her for an hour. Contact was often continuously maintained for the training of detector ratings and if the vessel were an enemy she could have been depth-charged at any moment.

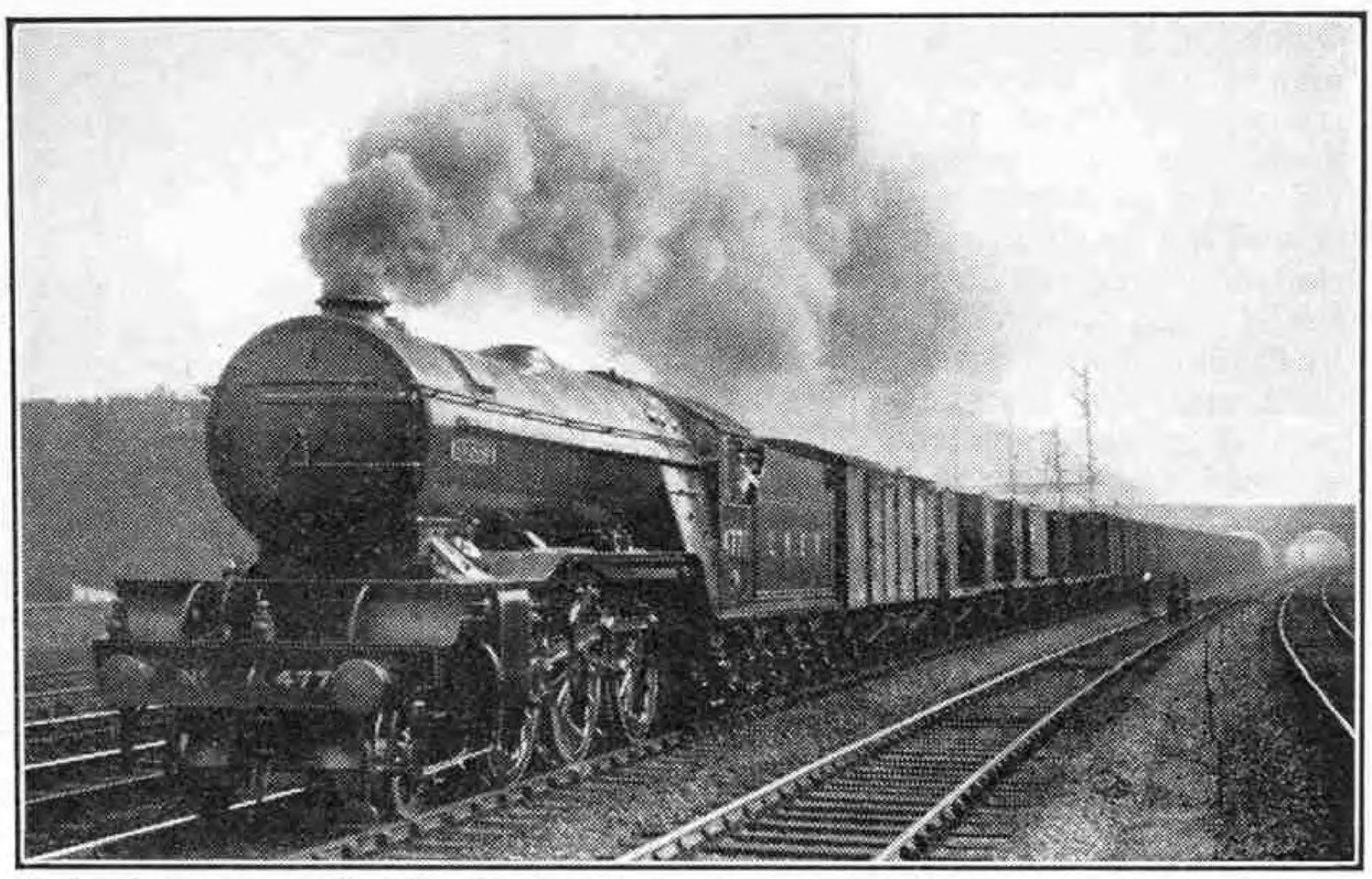
Large numbers of our destroyers, escort and hunting vessels have been fitted with Asdics, many since the outbreak of war, and such vessels are employed with (*Continued on page 423*)

On the Footplate of "*Green Arrow*"

A Famous Express Goods Train

By a Railway Engineer

WRITING of the famous 3.35 p.m. Scotch Goods of the L.N.E.R. brings memories of a very happy journey some little time before the outbreak of war. Freight train working in its most spectacular form is vividly recalled; yet although the days of such exploits have gone for a while, the locomotive performances about to be described are of particular interest at the present time when the demand for mixed traffic locomotives is so great, and the work they are doing is so vital a part of the nation's war effort. A type such as Sir Nigel Gresley's "V2" 2–6–2 is of inestimable value for passenger, freight, or any conceivable kind of traffic, though of course the wartime goods trains do not usually run so fast as we did on that memorable peacetime afternoon.



The 3.35 Scotch express goods getting into its stride through the London suburbs. This photograph was taken by Mr. H. Gordon Tidey on the occasion of the run described.

Arriving at King's Cross engine sheds I was pleased to find that we were to have the pioneer engine, No. 4771 "*Green Arrow*," and there she was being got ready alongside the streamlined "*Empire of India*," the engine for the "*Coronation*." What a picture they made, and how appropriate a one—engines for the "star" passenger and "star" goods of the L.N.E.R. standing cheek by jowl; and the characteristic London humour and friendly rivalry of their respective crews proved an excellent foretaste of what was to follow. Driver Hart and Fireman Cook were in charge of No. 4771, and climbing up into the cab I found that the "V2s" yield nothing to the "Pacifics" in the spaciousness and general convenience of their footplate layout. Soon after three o'clock we whistled up, and after negotiating the yard backed down into the adjoining goods station on to a train of no less than 42 vans, vacuum fitted throughout. The load was 550 tons behind the tender.

Readers remembering the pre-war timetable, and the simultaneous departure from King's Cross of the "*Coronation*" and a heavy dining car express for Yorkshire, may well wonder how a goods, however fast, manages to keep out of the way, particularly as there are several double line sections, with no chance of side-tracking, in the first 30 miles out of town. Well, the goods just had to "go" for it, and get out to Woolmer Green ahead of the flyer.

That "*Green Arrow*" was in charge of a master hand was obvious before we were through Finsbury Park. As soon as the engine had fairly taken the strain on the heavy ascending grade, the regulator was fully opened, and by carefully judged manipulation of the reversing gear that 550-ton load was lifted up the 1 in 105 incline through Holloway with comparative ease. Adverse distant signals were sighted through Finsbury Park, but all was clear again when Mr. Gordon Tidey secured the fine photograph of us reproduced on this page. "*Green Arrow*" was then fully linked up, and working on no more than 18 per cent. cut-off.

Our speed was soon little below that of the ordinary Scotch Expresses. Wood Green was passed at 45 m.p.h., and all the way up the long 1 in 200 climb to Potters Bar the engine was pulling so well that no opening out at all was necessary. Speed gradually fell to 32 m.p.h. The working was a little more strenuous than on a "Pacific" under the same conditions, for on account of the smaller wheels the cylinders were being filled and emptied somewhat quicker; but the boiler was steaming superbly, and much harder work could have been done if necessary.

Once over Potters Bar summit we developed some real express speed, and as we sped through Hatfield at 63 m.p.h., it was thrilling to take a quick backward look at our long train racing round the curve and through the station after us. The engine rode as smoothly as any "Pacific"—which is saying a good deal—but the nosing of the wagons from side to side was a vivid reminder of the increased drag on the engine that is always experienced in freight train working. The 17.7 miles from King's Cross out to Hatfield are covered in 25 minutes by the heavy Scotch expresses; with this enormous goods train we took just 30 minutes to do the slightly shorter distance, 17.1 miles, from the start in King's Cross goods yard.

We were already well on time, and at Woolmer Green signal box we slowed down to 20 m.p.h. to cross over to the relief line. This 22.9 mile distance had taken 37 minutes; it would have been another minute or so before the tail of the train was clear, and the time then being nearly 4.15 p.m., the "*Coronation*" was already hot on our heels. We rolled quietly along on the slow line, where from Stevenage onward permissive block working was in force; under this regulation a goods train is allowed to proceed, with caution, into a block section that is already occupied. Keeping a sharp look out we coasted at about 15 m.p.h. down the 1 in 200 gradient, and soon sighted another goods train crawling along in front of us. It was preparing to stop at Hitchin South Box. Slowly the distance between it and us narrowed until gently we came to a stop a wagon's length from its brake van.

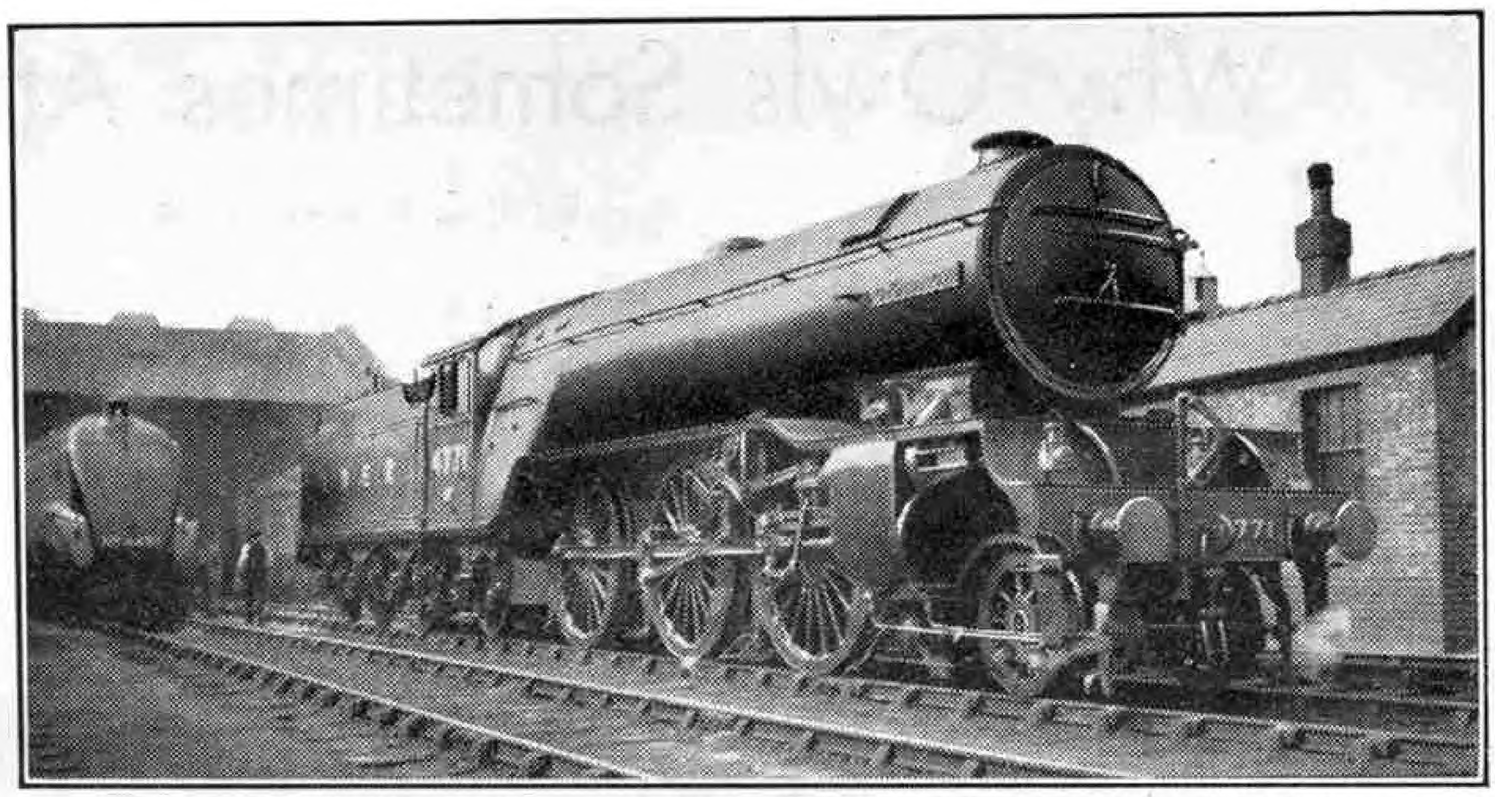
By this time the main line signals were pulled off, and then far down the line we sighted the steam of the "*Coronation.*" In an incredibly short time she was upon us, and at 85 m.p.h. she swept by, a glittering vision of blue. It was nearly ten minutes before the Yorkshire "diner" followed, her non-streamlined "Pacific" making a brave show with a big train; and after her there came the Lincolnshire portion, running as a second division, and headed by a Great Northern "Atlantic." The slow freight ahead of us had now drawn forward to Hitchin North signals and was waiting there on the relief line; but as soon as the Lincolnshire express was clear the points were set for us to re-cross on to the fast lines, and once again "*Green Arrow*" set off in real earnest. Although we had taken only 37 minutes to cover the first 22.9 miles, out to Woolmer Green, it was 4.46 p.m. when we left Hitchin—71 minutes and yet only 32 miles out of London. Our next stop was at Sandy, the only point where traffic is picked up, and the 12.9 mile run from Hitchin South was done very smartly in 19½ minutes, with a top speed of 62 m.p.h.

At Sandy five more vans were picked up, bringing our load to no less than 610 tons behind the tender. And now another famous express was not far behind, the "*Yorkshire Pullman.*" She had left King's Cross at 4.45 p.m. and was already nearly half an hour on her way. But with a clear road Driver Hart was evidently determined to show these passenger trains a thing or

two, and we made a most remarkable sprint for Peterborough. This part of the run was most instructive, for it revealed the qualities that go to the making of the really successful mixed traffic locomotive. First of all there is high accelerative power, displayed magnificently by *"Green Arrow"* as she simply lifted her 610 ton load away from Sandy. Again Hart's careful driving was a joy to watch, for nothing near to thrashing was employed to work the train up to 50 m.p.h., in just three miles from the start, on a level track. We were then running most economically, on 18 per cent. cut-off, and the regulator not even fully open; yet we took the rise to St. Neots without going below 48¾ m.p.h.

A still more marked easing of the engine took place after this miniature summit had been passed; the regulator was pulled back so that we had only 125 lb. per sq. in. in the boiler, and then on the very gentle descent towards Offord No. 4771 accelerated easily to 59 m.p.h. It was an exhilarating experience to witness such a happy combination at work, an extraordinarily efficient engine and the most competent of crews. The fireman was having very little actual stoking to do, so freely was the boiler steaming. As we bowled along I could not help wondering what a "Green Arrow" would do if really opened out, and just then the driver went a little way towards showing the answer to what was in my mind. The Stukeley bank lay ahead, and as we ran through Offord, Hart opened out to full regulator, leaving the cut-off at the almost invariable 18 per cent.

We passed Huntingdon at 58 m.p.h., and then, with only the faintest suspicion of effort, went sailing up that 1 in 200 bank, just over three miles of it, without the speed falling below 46 m.p.h.! This extraordinary feat takes some believing, but it helps one to understand how it is the "Green Arrows" manage to pull off such amazing runs when deputising for "Pacifics" on the fast expresses. A point that will perhaps not be quite so readily appreciated is the greatly increased "drag" on the engine nearly always experienced with freight trains. I have already referred to the comparatively rough riding of the wagons. After this particular run I set out to try and estimate just what the extra drag was, by carefully comparing the steam consumption, as indicated by the



L.N.E.R. 2-6-2 engine No. 4771 "Green Arrow" before the run. Photographs on this page by the author.

cut-offs used, on this trip and various other journeys on express passenger train where "Pacifics" were concerned. I must confess that the result was surprising, for it was shown, with little doubt, that this 610-ton load of wagons and freight was equivalent to fully 700 tons of bogie passenger stock, which of course rides much more sweetly. This "equivalent load" of 700 tons renders the performance of *"Green Arrow"* of still greater merit.

After we passed over the summit of the Stukeley Bank the regulator was soon brought back to roughly one-half open; and down the Abbotts Ripton incline we galloped faster than ever, reaching the highest speed I have ever noted with a goods train, 66 m.p.h. The speed fell off somewhat when we reached the level ground at Holme, on the fringe of the Fens, but Hart opened out a little, and we accelerated again to 62 m.p.h. on dead level road. The freedom of the engine when running at speed was good to experience, and there was a notable quietness in the way her motion was working. Even on the best tuned up engines there is usually a decided thump from the front end when working on short cut-offs with a wide open regulator, but despite the fact that her wheels were revolving considerably faster than those of a "Pacific" at the same speed, *"Green Arrow"* had one of the "sweetest" actions I have ever experienced.

This may account too for the extraordinary speeds that have been run by engines of this type when deputising for the Pacifics. It is not so very long ago that small wheels were held to be a drawback when fast running was required. But the great improvements in valve gear made in recent years have swept away any such ideas, and the feats of the "K3" Moguls, the L.M.S. Class 5 4–6–0s, and even the 5 ft. 8 in. 2–6–4 tanks of the L.M.S., have shown that even 80 m.p.h. does not by any means represent the upper limit.

One interesting feature of modern locomotive design was displayed frequently on my trip with *"Green Arrow."* Like all Sir Nigel Gresley's main line locomotives, she is equipped with a steam chest pressure gauge, and when the regulator was fully open I was impressed to see that the pressure in the steam chest was always within one or two pounds of the boiler pressure. Next to no pressure was being lost in the steam passages; these are streamlined internally, and in this respect the "Green Arrows" are definitely superior to the original non-streamlined "Pacifics." The value of this careful internal design of the steam passages was never shown more strikingly than on the occasion when one of the class was called upon, practically at a moment's notice, to work the *"West Riding Limited"* from King's Cross to Leeds. On this streamlined flyer she put up a magnificent performance, and would have kept exact time but for some signal delays on the way.

I seem to have taken a long time to get over the last miles into Peterborough, but there were so many features of interest about this journey that one has, so to speak, to stop and discuss them on the way. By the fine running already described we had passed Holme, 25.3 miles from Sandy, in 30½ minutes, and had averaged 54½ m.p.h. for 22 miles on end. And so, in spite of the usual cautious approach, we got through Peterborough North station, 32.3 miles, in the remarkable time of 38¾ minutes. Just north of the station we were slightly checked, as owing to the approach of the up *"Queen of Scots"* Pullman express the road was not clear for us to cross over into Westwood yard. But we managed to avoid a dead stop, and we got across and were comfortably stowed away on the reception road when the down *"Yorkshire Pullman"* came majestically through. At Peterborough *"Green Arrow"* was relieved by a "K3" Mogul, for the run to York.



No. 4771 "Green Arrow" alongside the streamlined 4490 "Empire of India" at the shed.

Why Owls Sometimes Attack People

By J. C. Bristow-Noble

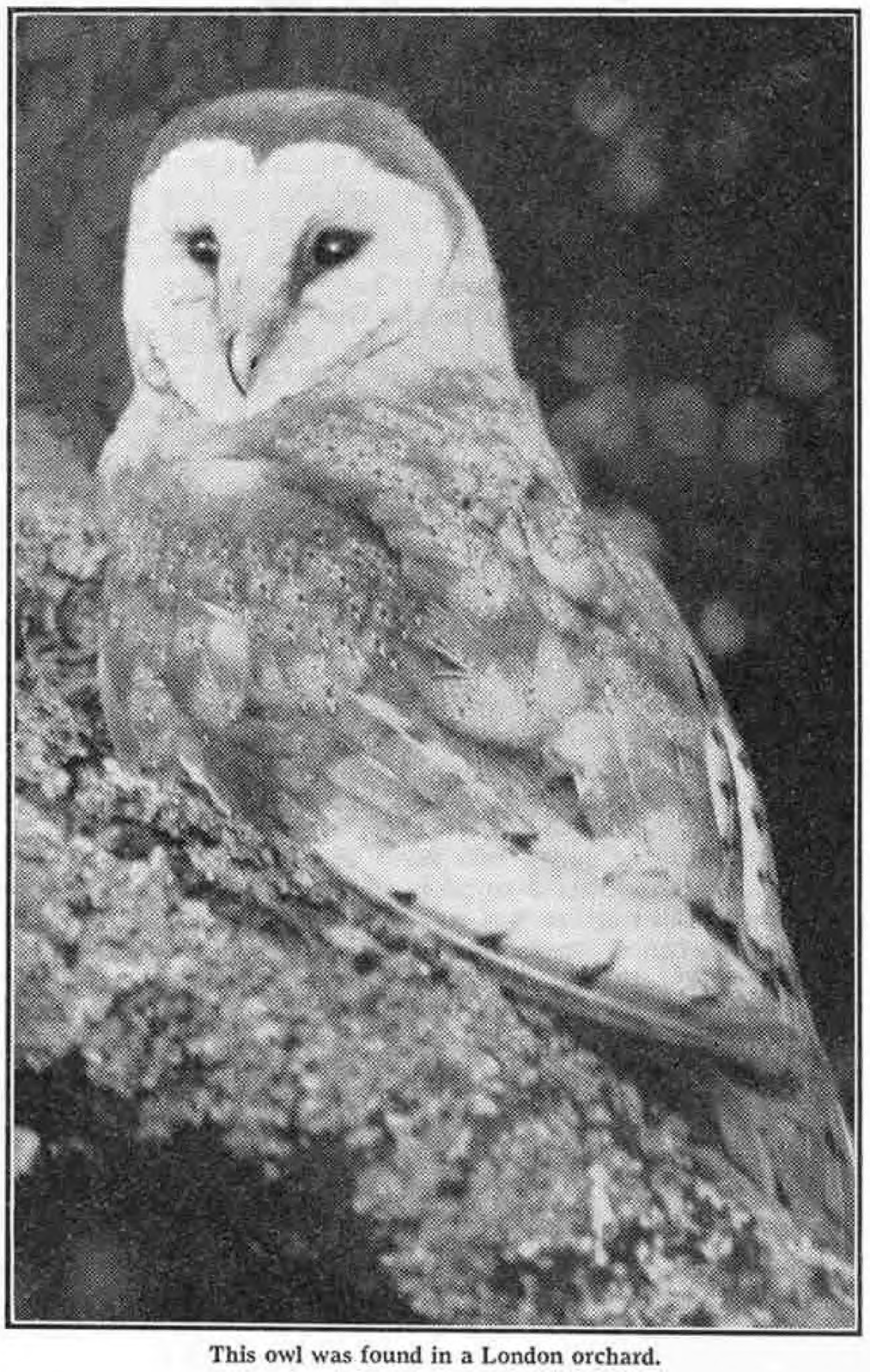
SEVERAL instances during the past year or two of owls attacking human beings both in London and the country have been reported in the newspapers. These attacks by owls are not uncommon, but only one now and again is referred to in print. The victims rarely suffer more than a slight slap on the face from one of the birds' wings.

The explanation of the attacks is that the owls resent the presence of human beings on ground that they are quartering for food. At the moment the intruders make their appearance, the owls, after perhaps much silent hovering, waiting and watching, are often on the point of picking up a mouse or rat. The noise of the human footsteps frightens the prey back into its stronghold in ground, hedge or shrub, and a considerable time may pass before it shows itself again. The owls in their disappointment and natural indignation seem to strike the intruders not so much with the intention of hurting them as of inducing them to hurry away and not be "spoil sports."

I have known several people, among them gamekeepers, shepherds and poachers, to be the victims of attacks by owls, but I have never known any one to be injured by the birds. Certainly it is startling, as one makes one's way through the dark night in some desolate place, suddenly to feel a slap on the cheek from, as it appears, an invisible and supernatural power; otherwise, there is little in the experience. The approach of the owls, of course, is neither seen nor heard. All the owls, the barn, wood, and short and long eared, with the exception of the little owl, will attack in this way.

A few years ago I was much interested in the behaviour of a pair of barn owls that had their quarters and a family over some stables. The birds generally began to collect food when the light was still good. Their favourite hunting ground was a meadow in which poultry were confined, and which at night was visited by rats and mice to feed on the grain lost by the poultry in the grass.

Immediately on making an appearance the owls set to work diligently to drive the poultry into their roosting houses and coops. Up and down the meadow the birds would fly, slapping hens, roosters, and chicks with their wings. If the



This owl was found in a London orchard.

poultryman came on the scene he also was slapped, much to his amusement. The appearance of the owls, after a few chastisements, was the signal for the poultry to make a hasty retreat into their sleeping quarters. The owls then began their quest for the rats and mice and in a short time had collected all the food they required.

In the roof of an old granary near the stables there was a pair of little owls, with some owlets. The former never interfered with the poultry, though had they cared to do so they could have slaughtered and carried away the small chicks wholesale. As the barn owls floated to and fro about the meadow the little owls took up positions on the roofs of the poultry houses, and from these posts of vantage watched and waited for quarry. The two species of owls appeared to be on good terms of friendship. At all events, though the barn owls resented the presence of the poultry and persons, they took no objection to the companionship of the little owls, noisy as they often were.

Incidentally it is not my experience that the little owl is the villain he is said to be. In addition to mice, small rats, shrews and weasels, he feeds also on beetles, cockchafers and other insects. I have never been able to trace that he kills and consumes other birds. I dare say he does feed on a small bird at intervals of a few weeks, but, although I have made very thorough investigations, I have never found him guilty of the offence.

During warfare owls have been known to become camp followers. There is the story of a barn owl that, during the Great War, made a nightly appearance near the cooking quarters of a regiment in France. Naturally the Tommies became interested in it and watched and waited for its visits. One morning the men found the bird near the entrance to the "kitchen" and immediately noticed that something was wrong with it. Mr. Owl had become a casualty; a chance bullet or a piece of shrapnel had broken one of its legs. The limb was carefully set and the bird retained until the break was thoroughly healed. Wise Mr. Owl!

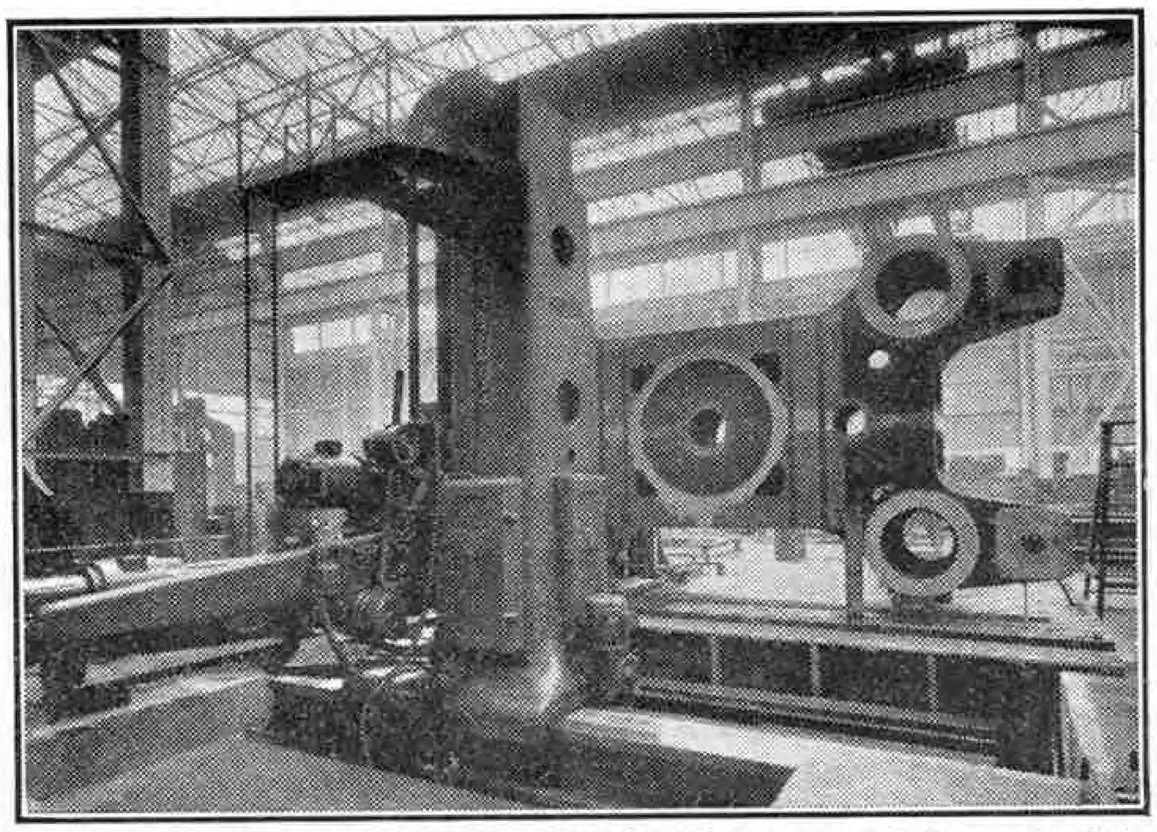
In conclusion I may add that the public should not give owls a bad name on account of their occasionally tapping some of us on the face. After all, as I have tried to explain, the worst part about these so-called "attacks" is the element of surprise. Cut that out and the attacks are not worthy of the name.

A Massive Drilling, Boring and Milling Machine

EVERYWHERE to-day we hear of the big speed-up in armaments production and the terrific efforts that our engineers and machine manufacturers are making to ensure an adequate supply of munitions and equipment to our fighting men. Many of the machines used in this vital work are wonderful examples of mechanical ingenuity, and one of the most useful of them is the milling machine, of which there are many different types.

Milling consists in the removal of metal by means of revolving cutters or mills made from very hard steel, mounted on the end of a rotating spindle, which may be horizontal, vertical or inclined in accordance with the requirements of the particular job in hand. A great advantage of the process is that it allows intricate shapes to be obtained, and machining can be carried out in parts of a forging or casting inaccessible by other processes. In some machines all the operations and movements of the cutters are automatic and are carried out independently of the operator. This is a matter of great importance when large numbers of similar parts are to be produced.

It is now a common parctice to incorporate in a single milling machine means whereby other forms of machining, such as boring and drilling, can be carried out. A typical example of one of these multi-purpose machines is shown in our cover illustration. This machine is shown at work milling the edge of a great sheet of armour plate, but it is suitable also for drilling and boring. It is one of the largest in a complete range of similar machines built by William Asquith Ltd., which are suitable for both light and heavy work. The features of each machine in the series vary slightly according to their size and the duties for which they are designed, but all are based on the same principles and all are equally accurate and efficient in operation. The approximate weight of the machine illustrated is 62 tons and it stands 24 ft. 6 in. high. It can deal with boring up to 6 ft. diameter, and will drill holes up to 6 in. diameter in solid steel, while machine facing can be done over diameters up to 7 ft.



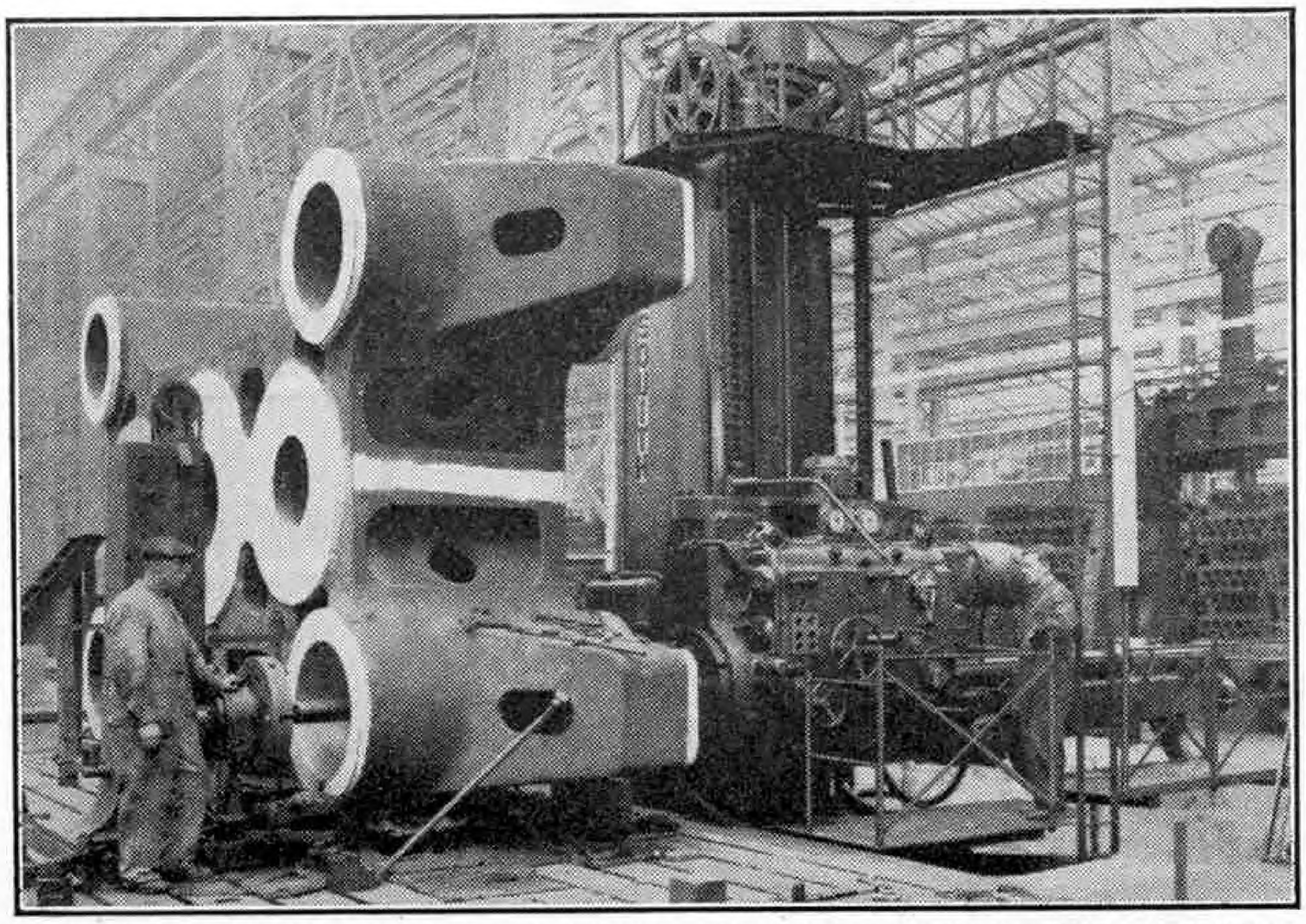
Another view of the Asquith Horizontal Boring Machine showing the massive bed and machined ways for the column.

Boring is used for a great many jobs in a modern machine shop, among which are machining of cylinder and valve chest walls of large engine castings, and surfacing foundation bolt holes in engine bedplates.

The chief features of a machine of this type include a massive bedplate with machined sliding ways on its upper surface. On these rests a vertical column, which can be travelled along them by means of a rack and pinion and gearing operated by an electric motor. The column carries a massive slide, which contains all the cutter spindle driving and feeding gear. A separate electric motor is provided for travelling the slide up and down the column, and the slide is provided with means whereby the spindle can be swivelled to any required angle within predetermined limits. In some machines the column also can be swivelled on the bedplate through 90 degrees.

The cutting spindle in the largest machine is 8 in. in diameter and is made from special quality steel. It is mounted in a long steel tube or barrel, which runs in conical bearings. In boring operations the cutters are fixed in a special boring bar, at right angles to its axis, and this bar is then inserted in the bore of the spindle, from which it receives its drive. The cutter can be fed to the work either by hand or by means of a self-acting mechanism, and the rate at which this takes place can be varied as required. All motions to the machine are controlled from the operator's platform attached to the spindle slide.

The main driving motor that operates the spindle of the largest machine develops 30 h.p. Motors of 15 h.p. are provided for traversing the column and the spindle slide.



An Asquith 8 in. Horizontal Boring Machine machining a cast steel press crosshead weighing about 73 tons. Photographs on this page reproduced by courtesy of the Davy and United Engineering Co. Ltd.



Costly Enemy Air Raids

Up to the end of June last over 100 enemy aircraft had been destroyed or seriously damaged during raids over this country, or round our coast since the war began. The rate of losses inflicted upon the raiders has risen rapidly since they began operations on a larger scale, and in the first 12 days of July alone nearly 80 German machines were definitely accounted for. By the end of July the enemy losses totalled over 300 machines. The introduction of night raids gave the British searchlight units their long-awaited chance, and they have made good use of it. After one recent night air battle an R.A.F. fighter pilot who shot down a Junkers machine was so impressed by the skill of the searchlight men that he wanted to give them the whole credit for his success.

More than 80 of the first 100 enemy aircraft were shot down or sent limping home by pilots of the R.A.F. Fighter Command. The remainder fell to A.A. batteries, aircraft of the Fleet Air Arm, ships at sea, and the Balloon Barrage. The crews who man the balloons, and the A.A. gunners, can claim a larger share of the damage to the enemy than mere figures suggest. The balloons help the gunners by keeping the enemy at arm's length, and the A.A. shell-bursts often put the R.A.F. fighter pilot on to the raider. Often both gunners and pilots score hits on the same enemy machine, thus jointly contributing to its destruction.

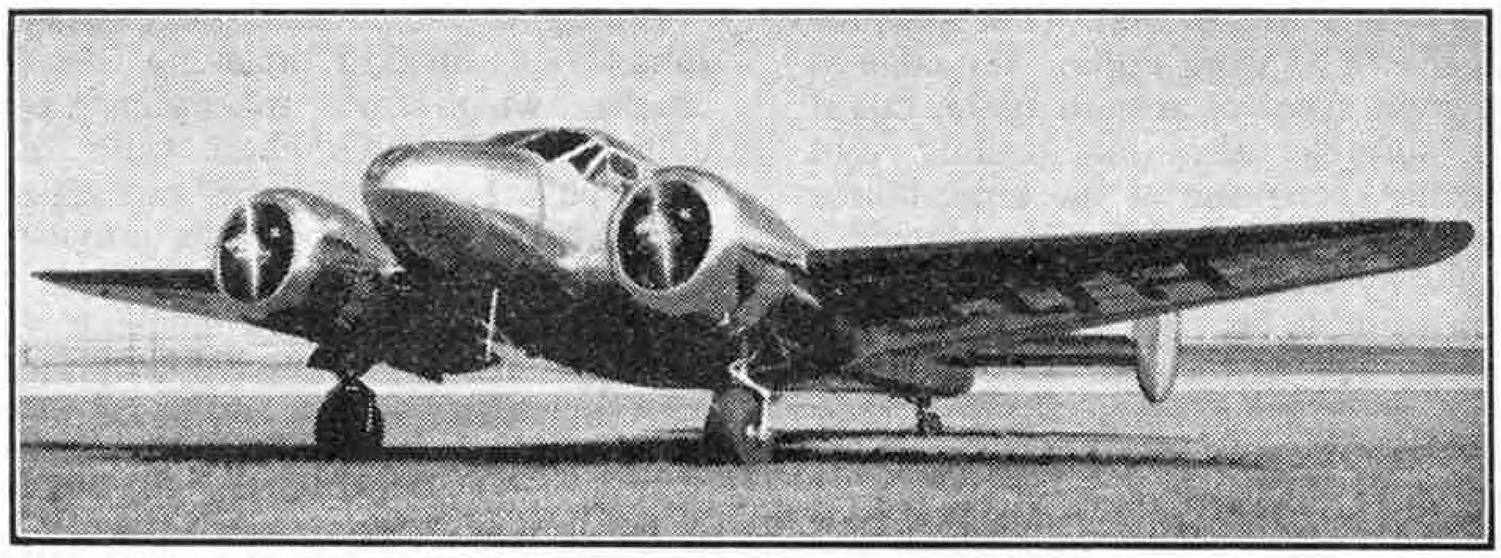
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Large numbers of Vega 37 bombers have been ordered for Great Britain. The machines will be produced by the Vega Aeroplane Company, a subsidiary of the Lockheed Aircraft Corporation, U.S.A. The 37 is said to be larger and faster than the Lockheed "Hudsons" that are doing so well in service with the Royal Air Force.

Back to Life

An R.A.F. Fighter Command pilot who had been "dead" for almost a fortnight recently returned to his squadron. He had been shot down behind the German lines, but baled out and landed safely, and after discarding his uniform and dressing himself as a peasant he had set about making his escape from enemy territory. He was stopped and searched by German soldiers, however, and failing to satisfy them, he was taken prisoner. After 24 hours' detention he escaped during the night, and eventually reached the coast and got back to England.

Upon returning to his squadron the pilot found that he had been posted as "missing," his name had been removed from the Squadron list, and at his family's request his fellow-pilots had wound up his affairs. His motor car had been sold, bills paid, and his bank account closed. He was soon re-equipped, his motor car replaced, and he celebrated his return to duty by shooting down two enemy aircraft.



One of Canadian Airways' new fleet of Beechcraft 18A twin-engined transports. Photograph by courtesy of Beech Aircraft Corporation, U.S.A.

The Luton "Major" Two-Seater

The lower photograph on this page shows the Luton "Major," a two-seater high wing monoplane designed as a safe training and touring aircraft. The 62 h.p. Walter "Mikron" II engine with which it is fitted gives it a top speed of 105 m.p.h. and it can climb to 3,000 ft. in 6½ min. Behaviour at stalling point is excellent, and the machine can be flown almost indefinitely as slow as 40 m.p.h. without the slightest tendency to drop at either wing. The load-carrying capacity is 430 lb. and the range is 300 miles. The machine can get off the ground after a take-off run of 80 yd., and the landing run is 50 yd.

The "Major" is built mainly of spruce and plywood, with the wings attached to the upper longerons of the fuselage and braced by two long, inclined Vee struts, one at each side of the fuselage. The wings can be folded, for stowing the monoplane in a small hangar. There is a comfortable enclosed cabin, with two seats one behind the other, and full dual control.

American Flying Test Bed

A Vultee type monoplane bought by the Pratt and Whitney Division of the United Aircraft Corporation, U.S.A., is being used for flight testing various types of Pratt and Whitney aero engines. It has been fitted with an engine-mounting that can be easily adapted to take any particular type of P. and W. engine.

For recent flight tests with a 17 ft. dia. Hamilton airscrew the retractable undercarriage had to be replaced by a longer and fixed one, and the vertical tail surfaces greatly increased to counter-balance the effect of the larger airscrew in operation.

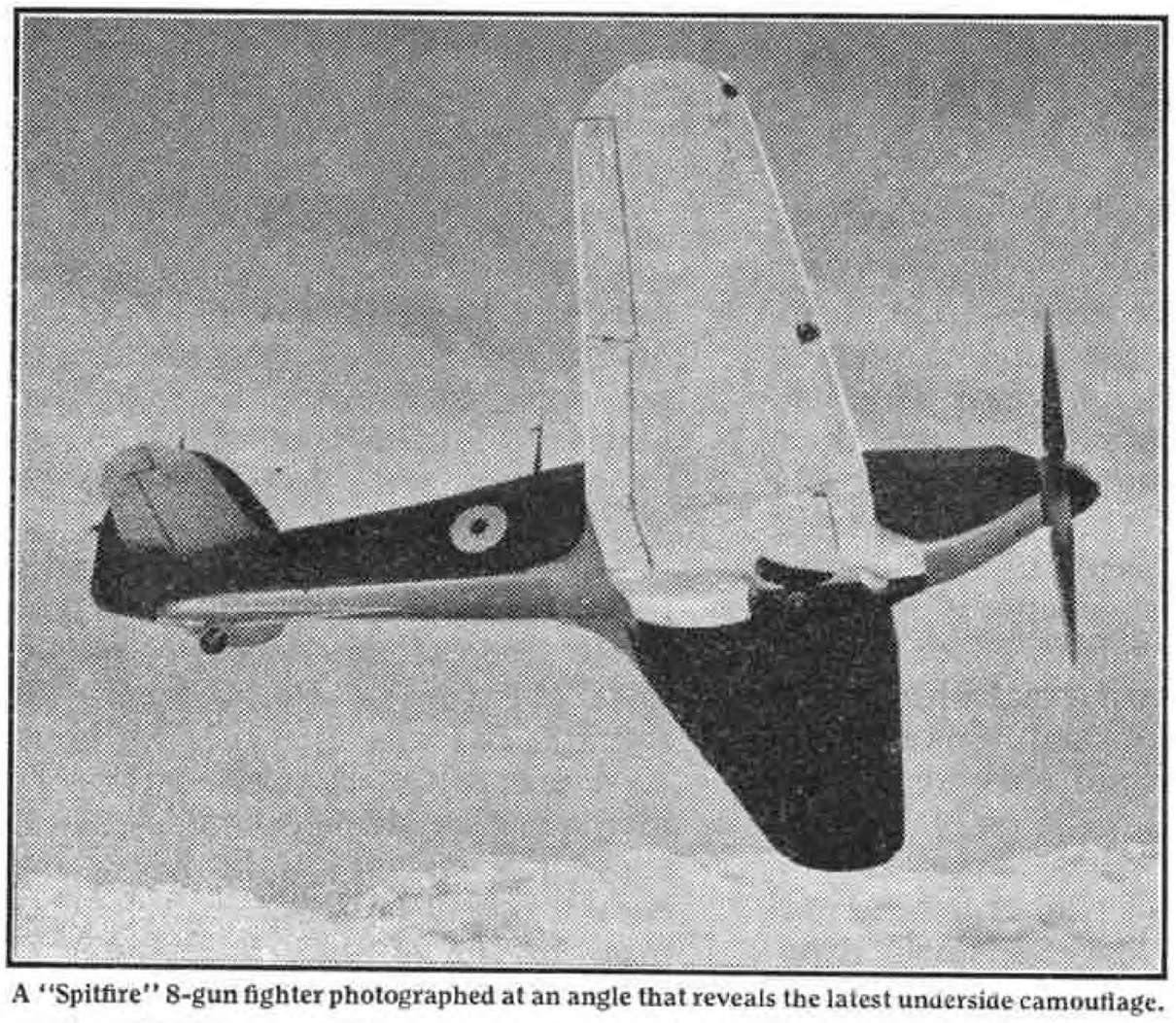
In England a "flying test bed" for high-performance aero engine research is used by the Bristol Aeroplane Co. Ltd. The aeroplane employed is an American Northrop two-seater low wing monoplane purchased in 1937.

R.A.F. "Hudsons" Fly a Million Miles on Reconnaissance

The first Royal Air Force squadron to be equipped with "Hudson" aircraft has completed 1,000,000 miles of flying in this American-built military version of the Lockheed 14 transport. The squadron belongs to the Coastal Command, and its chief work is general reconnaissance over the North Sea, as part of the "eyes" of Britain's defence system. In this capacity it has done immensely valuable work in detecting the movements of enemy forces by land, sea, and air. Its crews fly for hours in all states of weather, out of sight of land, and its navigators are among the most experienced in the R.A.F.



The Luton "Major," an attractive two-seater monoplane of the braced high wing type. This photograph and those on the next page are by courtesy of "The Aeroplane."



A "Spitfire" 8-gun fighter photographed at an angle that reveals the latest underside camouflage.

In addition to this vast reconnaissance work the squadron has many successful bombing raids and air battles to its credit. The "Hudsons" have attacked successfully harbours, ships, and other enemy military targets, and the squadron's log books show records of more than 50 thrilling air fights in the course of which at least 12 enemy aircraft have been shot down and many others damaged. U-Boats also have been among the victims. Working in close co-operation with the Royal Navy the squadron has often provided an air escort for our warships, and on several occasions has driven off attempted enemy air attacks upon them.

Four of the officers of this fine squadron hold the D.F.C. and four of the airmen have the D.F.M. About a quarter of the pilots come from the Dominions.

Detecting Aircraft 50 Miles Away

Aircraft detectors of a new type are to be installed along the Atlantic, Pacific, and Gulf coasts of the United States, and in the Panama Canal zone. It is claimed that the new apparatus is sensitive enough to detect the approach of an aeroplane when this is at least 50 miles away. The design is a carefully guarded secret, but it is believed that light waves able to penetrate fog and darkness play an important part in the operation of the detector.

"Heracles" Last Service

"Heracles," one of the largest and most famous of British air liners, has paid a last service to the country she served so well for nine years. She has been broken up, and her aluminium parts handed over by British Overseas Airways Corporation to the Ministry of Aircraft Production, in response to Lord Beaverbrook's appeal for aluminium scrap. The parts included the control wheels, pilots' chairs, rudder control stirrups, a throttle control box, and sundry smaller engine parts.

"Heracles" was one of the Handley Page air liners built for Imperial Airways in 1930. She made her maiden flight in September 1931, and by the outbreak of war she had flown more than 1,500,000 miles and had carried over 100,000 passengers. In all that time she did not make one emergency landing, and not a single passenger was injured. This fine aircraft operated mainly on the London-Paris route, but when war began she was requisitioned for work of national importance, and was on call at all times for the transfer of high officials and members of the Services from one scene of operations to another. In this capacity she made over a score of flights to wartime France.

This "Grand Old Lady of the Air" maintained her fine record of safety to the end. One windy day a few months ago she was being overhauled on an Airways landing field when a gust of wind lifted her bodily and swept her across the aerodrome, damaging her beyond repair. Not one of the 26 workmen on board was even scratched.



The Handley Page "Hampden," one of the bomber types doing fine work with the Royal Air Force.

New Heinkel Fighter

The Heinkel He 113, a new and improved single-seater fighter, is now in service with the German Air Force. It is armed with one motor cannon and two large-bore machine guns, and is believed to be fitted with a 1,500 h.p. engine. The He 113 is an all-metal machine, with straight tapered wings and a retractable undercarriage.

Adventures Over Germany

The crews of Royal Air Force aircraft which fly almost nightly over Germany and German-occupied territory have all kinds of adventures. Some experience narrow escapes, others encounter intense opposition from anti-aircraft batteries, and by contrast some have, for various reasons, a comparatively easy time. The reports prepared when the crews return to their bases show plainly that whatever the conditions encountered the attacks are vigorously pressed home.

The crew of one aircraft detailed to attack military objectives in a specified area reported upon return that during their raid they had attacked a supply train. According to the Sergeant pilot, the train was observed just as it was leaving a station, and within a few minutes a dive attack was made upon it. The first bomb missed it and hit some sheds 30 yd. away. Another bomb twisted the railway track for hundreds of yards and brought the train to a standstill, and it was then machine-gunned. A quarter of an hour later the pilot attacked a German aerodrome, and scored several hits on the landing field and hangars.

One night recently an R.A.F. machine taking part in a raid over north-west Germany encountered severe opposition from powerful land batteries, and one small shell bursting inside the fuselage passed between the Sergeant pilot and the wireless operator without injuring either of them. The shell, however, made it difficult to open the bomb doors, but, reported the pilot: "We soon got the bomb doors open ready for a subsequent attack, by manipulating a few gadgets and throwing the aircraft about in all directions."

Orville Wright to get "Honorary Pilot's License No. 1."

A Bill submitted to the United States Government aims at awarding to Orville Wright, the famous air pioneer, an honorary aircraft pilot's license, in recognition of his "outstanding service to the Science of Aeronautics." This will be the first such license granted in that country. Orville Wright made the first successful flight in a heavier-than-air, power-driven aeroplane, at Kitty Hawk, North Carolina, U.S.A., on 17th December 1903.

R.A.F. Inflatable Dinghies

Royal Air Force machines have an inflatable dinghy stowed on board for use if the aircraft are forced down in the sea. These dinghies are now being painted bright yellow, as this colour makes them visible from a considerable distance, and therefore is a definite aid to aircraft searching for an R.A.F. crew who have had to abandon their machine while flying over the sea. As a further help to speedy location by rescuers the crews are provided with vivid yellow skull caps to wear in such an emergency.

Success of Autogiro Postal Service

Eastern Air Lines' Autogiro postal service between Philadelphia Post Office and Camden Airport, New Jersey, U.S.A., is a great success. Over 2,100 regular flights have been made since the service began, and only one accident has occurred.

The Bridge that Failed

By Major H. V. Gorle, D.S.O.

LEAVING Abercorn, Northern Rhodesia, for Fort Jameson, some 500 miles distant, we decided to cross into Nyasaland and go south by the main Blantyre Road as far as Mzimba, then turn west into Rhodesia. This decision was our undoing.

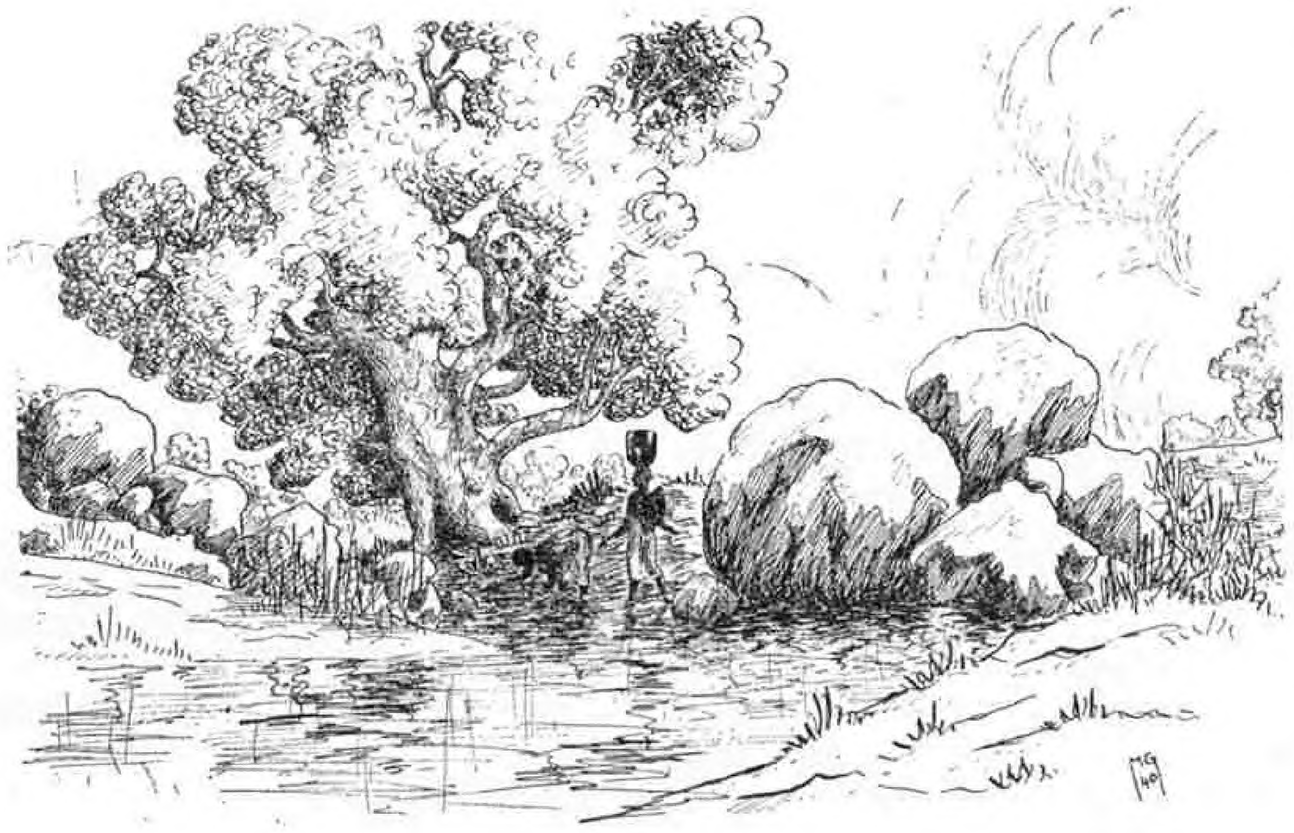
Our party consisted of my wife and daughter, travelling in a small touring car, and myself, who, with three natives, a monkey, ducks, and fowls, drove a six-wheeler lorry. Two dogs and a cat also formed part of the menagerie.

My wife and daughter went on ahead and I followed. After we had gone some 14 miles on the level the track took a sudden turn down hill. As the lorry was travelling at about 18 miles an hour I couldn't hold her with the brakes against the grade. Some 100 yards further on there was a sharp bend, and I saw that there would not be the slightest chance of my taking it without turning the lorry end over end, as by the time that I got there the lorry would be travelling at sixty or seventy miles an hour, I therefore turned off the track, so that I could run across the grade instead of down it. All would have been well only there was a pit from which ballast had been taken to repair the road, into which my off wheels went, smashing a front spring and jamming the steering gear. Luckily I had got her across the grade and was able to stop her with the brakes without further damage.

We decided to camp for the night. The next day was spent putting in a new spring and straightening the steering gear. Everything having been put in order, we went on our way next morning.

The four days that followed were without incident. We crossed into Nyasaland at Fort Hill and got among the hills forming the western boundary of Lake Nyasa, which lies in the Great Rift Valley. The surface of the road was good, but it was like a switchback, up and down the whole time. The grades were steep, and the pole bridges and culverts in a very bad state of repair. One had to stop constantly to examine them before attempting to cross over, and in many cases forked trees had to be cut down and placed under the road bearers to give them enough strength to stand the weight of the lorry.

One afternoon I reached a bridge of many spans, which looked quite sound, and beyond turning off the three natives, I went on. I had got nearly across when there was a great cracking of timber behind and the tail of the lorry began to drop. I accelerated, but that only increased the pace of descent, so I switched off the engine lest anything should catch fire. At the same time the tail of the lorry came to rest in the bed of the stream, while the fore wheels remained on the decking, which had not given way, between two piers. My people, who had made camp on some high ground just across the stream, came running down to see what had happened, and were able to save some fowls and a monkey that were under water in their cages at the back of the lorry.



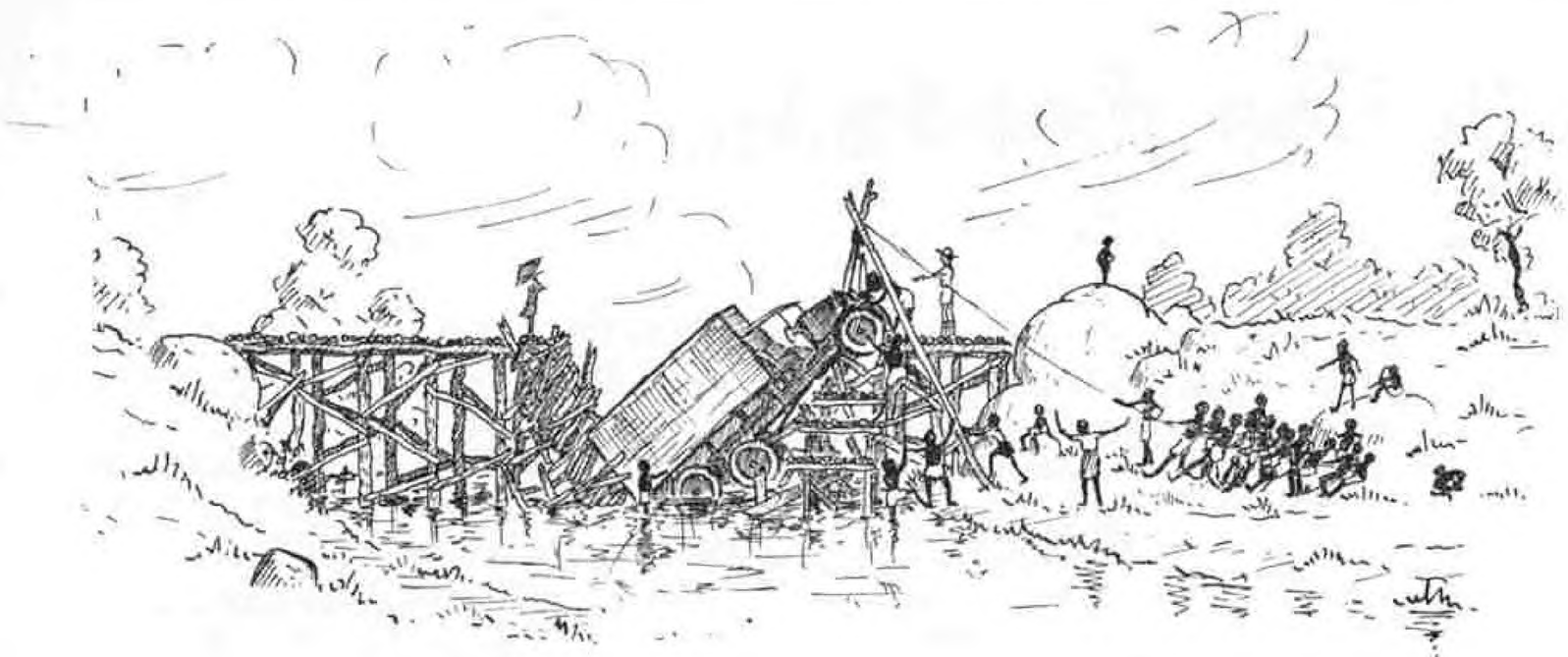
I called some natives from a village near by to come and make a drift beside the track, so that if there was any traffic it could get by; and had as much of the load taken off the lorry as possible that night. Next day off loading was completed and arrangements were made for lowering the front wheels of the lorry on to the ground. Some boys were sent to get the inner bark of the malusi tree to make rope; others to get poles to make a derrick, and platforms for the front wheels to rest on as they were lowered step by step to the ground.

The ropes and derrick being ready, the former were fastened to the dumb irons of the lorry and passed over the top of the derrick; the running end was then held by boys. As I was afraid that the bark-rope might not be strong enough to bear the whole weight of the lorry, and would possibly break and let her drop to the ground, a distance of 12 ft., I had platforms made with a drop of 18 in. between each, so that if the rope did go she would only fall a short distance and not be badly damaged as she might have been if she had fallen the whole way.

It was an anxious moment when the boys took the strain, and the decking was taken from under the fore wheels, lest the gear should give way. Luckily it held, and the lorry was lowered on to the first platform, and so on until she was safely on the ground.

The back wheels had to be jacked up out of the water, and a bridge built over the stream so that the lorry could be backed on to the drift already made. When this work was done she was started up, backed on to the drift, then on to the road, the boys shrieking and howling with delight as she climbed the hill out of the river bed. We loaded up at once ready to move off the next morning.

As we were having breakfast a white man appeared and told us that a lion had killed one of his cattle, and that he was going to sit up for it that night. My wife suggested that we should postpone our departure and join him in his vigil, and he agreed to have a machan made big enough for all of us. He called for us about two o'clock, and having provided ourselves with tea and food we went with him to the place where he had built the machan



overlooking the kill. We settled down comfortably and waited.

The hours went by, and we had tea. Still no sign of the lion, and we were beginning to think that he had got our wind and was not coming, when, as the light was beginning to fade, we saw our friend creeping along among the undergrowth. Then he disappeared behind a clump of small trees and we saw nothing more. It grew quite dark, but we knew that the lion was still close by as we should have seen him if he had gone away in the daylight, and it was not likely that he would leave his kill after dark.

After a few moments the sound of bones being crunched came to our ears. "He's on the kill," whispered the Hunter, switching his torch on to the dead ox. The lion was eating, with his head inside the carcase; he looked up as the light fell upon him, then went on with his meal.

The Hunter, holding his torch along the barrel of the rifle, fired, but apparently missed, as the lion again looked towards us, then continued eating as before. The Hunter fired a second shot, and this time the lion's head dropped on to his paws, and he lay without further movement. We waited some time, but as the lion continued in the same position we concluded that he was dead. The Hunter and I climbed down from the machan to investigate. We beat up all the bush within a radius of 50 yards from the kill before going to the lion, in case any of his pals should be near. After making quite sure that the lion was dead, I called my wife and daughter down from the machan, inspected our bag, then went back to camp, quite satisfied with our night's vigil.

The Road Man came as we were starting next morning and told us that a bridge some 20 miles further on was in a very bad state of repair, and that a party from the Union of South Africa had been obliged to turn back as one of the lorries could not negotiate it. We felt really cheered (?) but decided to go on.

We left camp on the fifth day after falling through the bridge, but were obliged to stop after we had done about 15 miles, as it was getting late in the afternoon, there having been so many culverts to be repaired before we could cross them. We had just let our fowls, etc., out on the road, when a motor van drew up, and we found that the driver was the Bishop of Northern Rhodesia, whom we knew well. He told us that he had nearly crossed a bridge a few miles back when the last span gave way. The pace at which he was travelling was just fast enough to carry him on to the ground on the far side before his van turned over. He got it put back on to its wheels, and then found that no real damage had been done so was able to continue his journey.

We left early the next morning, and had breakfast while the boys were carrying our loads across the bridge that had defeated the party from the Union. This bridge was in waves and had a twist in it, so that one had to climb up and down, with the chance of sliding over either side alternately; but my lorry having no "sideways" she went over quite happily. We camped that night about 45 miles from Mzimba Boma.

While sitting by the fire after our evening meal we heard the piercing scream of some wretched animal caught by a beast of prey. Our cat came from the tengo, where she had been hunting, swearing like a trooper; the puppy rushed off and hid himself in a dry culvert from which he had to be dragged howling in terror, and it took a considerable time to calm his shattered nerves. Peace was restored at last, however, and the silence of the wild settled upon the earth.

The next morning my wife drew my attention to lion spoor that was all round the place where we had slept. From this it was clear that lion had been prowling about for the greater part of the night, but had not been able to summon up enough courage to attack us. We didn't pay much attention to this at the time, but when we got to Mzimba, that evening, the Resident remarked that he hoped that we had not camped about 50 miles farther back as there was a pride of very bad man-eating lions on that part of the road, which had taken many natives and so far had escaped every effort made to destroy them!

We turned off the Blantyre Road shortly after passing Mzimba and made for Lundazi in Northern Rhodesia. We were delayed at a bridge just before crossing the border for a couple of days, but when this had been put in order we had no further trouble.

The Resident kindly gave us lunch at the Lundazi Boma, and we reached Fort Jameson the next afternoon, having taken three weeks to do the journey we could have done in six days if the bridges had been sound.



From Our Readers

This page is reserved for articles from our readers. Contributions not exceeding 500 words in length are invited on any subject of which the writer has special knowledge or experience. These should be written neatly on one side of the paper only, and should be accompanied if possible by original photographs for use as illustrations. Articles published will be paid for. Statements in articles submitted are accepted as being sent in good faith, but the Editor takes no responsibility for their accuracy.

Dunkirk—A Pilot's Story

Every day we went out on patrols from England over the front line. On this particular occasion we were patrolling Ostend to Dunkirk. Everything seemed amazingly quiet when we got there, until, without any warning, dozens of Junkers 87s (dive bombers) appeared and started bombing troops on the beach at Dunkirk, waiting to embark for England. So we went in to attack. Then suddenly I saw that several thousand feet above they had a huge fighter escort comprised of Messerschmitt 109s and 110s. They swooped down. Our formation broke up, and a terrific dog fight followed—everyone for himself.

I saw a 110 going for one of our boys, so I dived at him flat out; but before I could get within range, a 109, who must have been sitting on my tail, opened fire, and tracer bullets came screeching past. I had to give up the idea of attacking, and try to defend myself. I dived down towards the sea at about 400 m.p.h., and turned underneath him.

When I had recovered my senses I saw that smoke was pouring out of the engine, and the cockpit was full of it. I knew that I would never reach England, so I undid my harness ready for a parachute jump. Apart from the boats in the harbour, however, there would have been nothing to pick me up; so I decided the beach might be a good place to pop down on. By this time the bottom of the cockpit was on fire, so things had to be done quickly but calmly.

At the time I was uncertain whether the Germans were in the town or not; however, I landed on the sands, with my wheels up. The machine stopped instantly and jerked me forward suddenly. I got out, and having an automatic with me, fired into each petrol tank. Bullets were whistling all over the place, as the battle was still going on up above, so I stayed beside the aeroplane for a while. Several Huns went spinning out of control into the sea, and it was quite exciting to watch.

Then, when things had quietened down a little, I walked over to some pill boxes where I saw signs of military activity, and to my delight I found they were French marines. They asked me all sorts of absurd questions, but very generously gave me a drink and a packet of cigarettes. I was taken to see the C.O., who asked me if I could give him anything from my aeroplane, because he said they were practically surrounded by the Germans. I told him that he could have my eight machine guns, which were undamaged, and all the ammunition, also my radio, though I think that was wrecked. They asked me what I wanted to do. I felt like laughing and saying: "I should like to go to the pictures." I told them in very bad French that, if possible, I wanted to get back to England to rejoin the squadron. They told me that there was a destroyer actually in the harbour, and that they would take me in their car to Dunkirk. This trip was particularly hair-raising, with stray bullets coming from the sky and whistling about the streets.

Eventually we arrived at Admiralty headquarters in Dunkirk and I was introduced to the British Liaison Officer, who was an exceedingly nice man.

By this time the battle had ended, and the Jerry dive bombers came over again, in waves of about a hundred at a time. They bombed us for four hours continuously. The Liaison Officer thought he could get me away on the destroyer when it was dark, as it was not safe to attempt it until nightfall. So I had what little food there was and went back to his office, where



The brilliantly coloured village sign at Swaffham, Norfolk, the story of which is told on this page. Photograph by H. J. Pitts, Bromley.

he informed me that my destroyer had been sunk by dive bombers and that I would have to stay the night. So I made a sort of bed on a table in one of the offices.

Then a General came in and asked me what had happened, and said that if I didn't clear out then I might be a prisoner of war in the morning.

Carefully I walked down the badly-bombed road to the harbour. The town was illuminated like a seaside resort; the huge petrol containers, which had been bombed, had been blazing for days.

Eventually I reached the mole, where a lot of wounded troops were lying, and enquired about a boat. I was told that a mine-sweeping trawler was moored at the end of the mole, so I made my way along. Then I felt awful—I could hear aircraft above, and there wasn't even a hut to shelter in. Searchlights were turned on, anti-aircraft opened fire—and then the swine started bombing the troops on the beach. How he missed the boats I shall never know.

The wireless operator on the boat gave me his cabin, but I couldn't sleep. We steamed out of Dunkirk at 3 a.m., and I watched the blazing inferno get farther and farther away. It took seven hours to get to Dover, but I was so pleased to see the white cliffs of Dover that all I could do was to laugh.

PILOT OFFICER, R.A.F.

The Legend of the Swaffham Pedlar

A curious legend of a pedlar who found wealth is recalled on the beautifully carved and brilliantly coloured pictorial sign at Swaffham, Norfolk, which is illustrated on this page. The sign is the work of Mr. Henry Carter, a nephew of Howard Carter, the famous Egyptologist.

It appears that John Chapman, a tinker, or pedlar, of Swaffham during the reign of Henry VII, dreamed that if he journeyed to London and stood on London Bridge he would meet a stranger who would bring him wealth. He immediately packed his bag, and started on his long trek to London, the city "paved with gold," his only companion being his dog, which is shown with him on the sign. After waiting on the bridge for some time he started a conversation with a shopkeeper, to whom he told his story. The shopkeeper derided his yarn and told him to go back home again, as he himself had dreamed several times that at Swaffham Market in Norfolk a pedlar named John Chapman had a tree in his garden under which he would find buried a pot of money. The shopkeeper added that he himself had no time for dreams.

The pedlar said nothing, but hurried back to Swaffham to dig. Sure enough, there was the treasure, and on the spot was inscribed the words: "Under me doth lie, Another much richer than I." The pedlar dug more furiously and soon unearthed more treasure.

Whether or not there is any truth in this legend, the fact remains that in the parish records it is stated that part of the church was built by "John Chapman, the Swaffham Pedlar." In addition a statue of the pedlar with his pack on his back was preserved in the church for many years.

H. J. PITTS (Bromley).

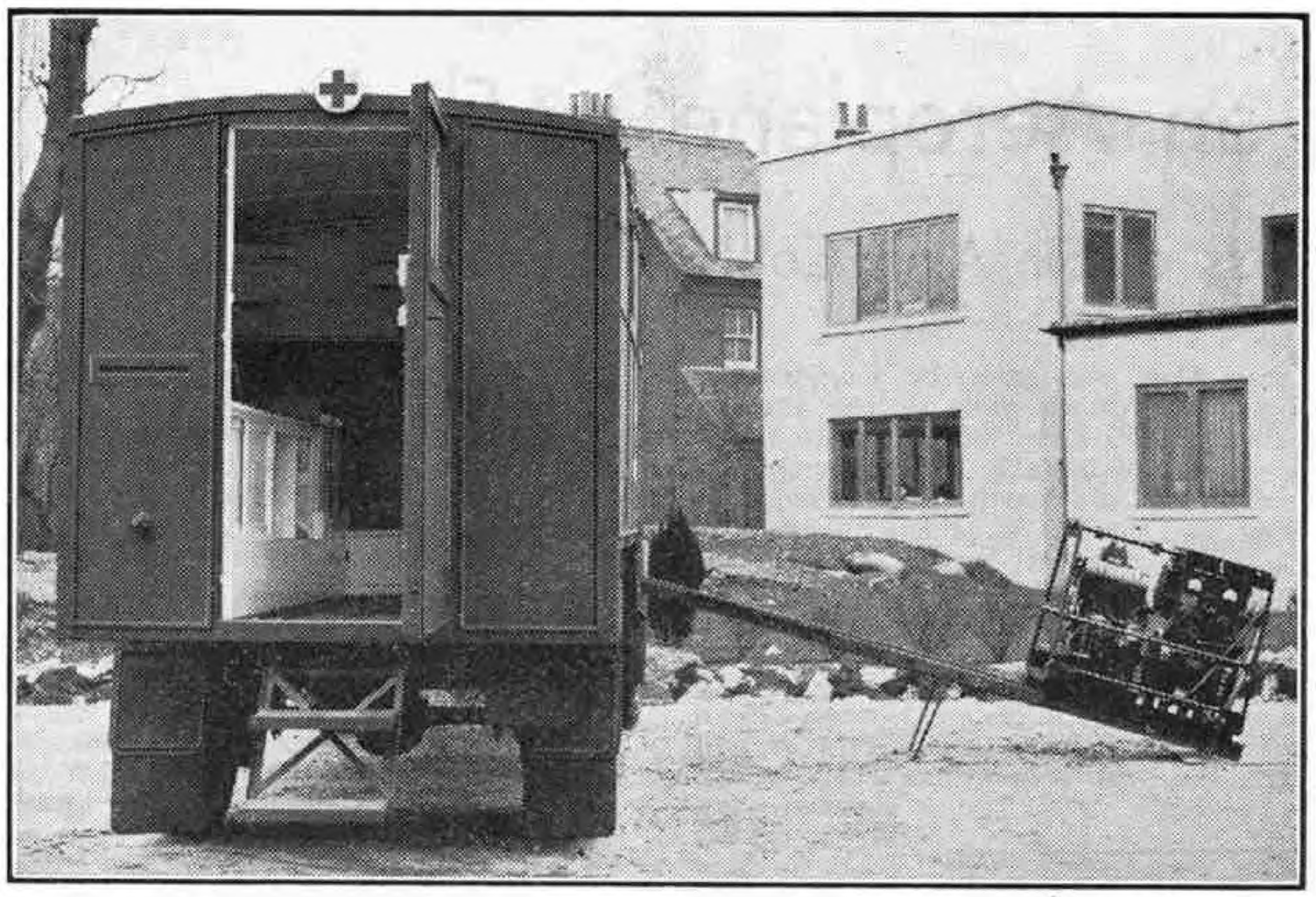
Culbin Sands

Culbin Sands are on the south bank of the Moray Firth, about 10 miles from Nairn. They are four miles long and two miles broad, and consist of a succession of hills rising in places to 100 ft.

These sands are reputed to have covered a village about two centuries ago. One night there was a great sandstorm that half submerged the village, before it eased, only to attain greater violence in the morning when it completed its work. A few years ago the dovecot and chapel of the village reappeared, and their ruins supplied stones for neighbouring farms.

The sand itself is very light and powdery and the wind mottles it into wave lines. In one part the former course of the River Findhorn can be traced, and on the old bed of the river are furrows made by the plough over two hundred years ago.

G. F. STOREY (Edinburgh).



A view of the Lagonda mobile X-ray laboratory showing the generating unit and the ramp by which it is removed from the vehicle when the laboratory is in action. Photograph reproduced by courtesy of Lagonda Motors Ltd.

Engineering News

A New Road Kerb to Aid Night Drivers

A white-faced kerb which reflects light and is easily visible to motorists at night has been developed in the United States. It is formed from concrete and has a sloping face covered with about 1 in. of white mortar, the surface of which is indented with saw-tooth-shaped serrations. The vertical faces of the serrations face towards oncoming traffic and act as small reflecting surfaces to throw back light reaching them from the headlamps of approaching cars.

A Mobile X-Ray Laboratory

Lagonda Motors Ltd., who are fully occupied with work of national importance, have turned some of their plant over to the manufacture of the mobile X-ray theatre illustrated at the head of this page.

X-rays offer the only satisfactory means of ascertaining the nature and extent of fractures, and the exact location of metal fragments embedded in the tissues. Such injuries are frequent under active service conditions and swift action is the most important factor in minimising their ill-effects and leading to rapid recovery. This well-planned and self-contained mobile X-ray laboratory is equipped to enable minor radiographic examinations to be carried out with the minimum of delay, thereby assisting the surgeons in their work, and it is capable of producing an X-ray photograph within an hour of reaching its working base.

The laboratory contains a portable X-ray unit that can be quickly erected close alongside. The electricity supply necessary to energise the high tension transformer of the X-ray unit is generated by a petrol-electric set mounted in the forward part of the body. This feeds the X-ray set via a rotary convertor having an output of 65 volts A.C.

A number of films can be dealt with simultaneously, the laboratory being fitted with tanks for developing, fixing and washing and racks for accommodating the films while they are drying. Under the benches provided for loading and unloading the film cassettes are cupboards for storing ample supplies of unexposed film. The benches are illuminated by special X-ray safe-lights and lanterns are provided for viewing the finished films. Together with the general lighting these electric points take their current from the petrol-electric generator, while as an emergency measure in case the latter should be put out of action, there is a separate circuit from the starter battery.

The body of this X-ray theatre is mounted on an Albion type XL.127 chassis.

On the vehicle reaching the scene of its activities, the generating unit is run down a ramp and placed in such a position as to prevent any possibility of interference with the actual X-ray part of the vehicle while it is generating the required power and light. It is the work of only a few minutes to position and expose the X-ray film, which is then developed in the very completely equipped laboratory.

New Japanese Twin Screw Motor Ships

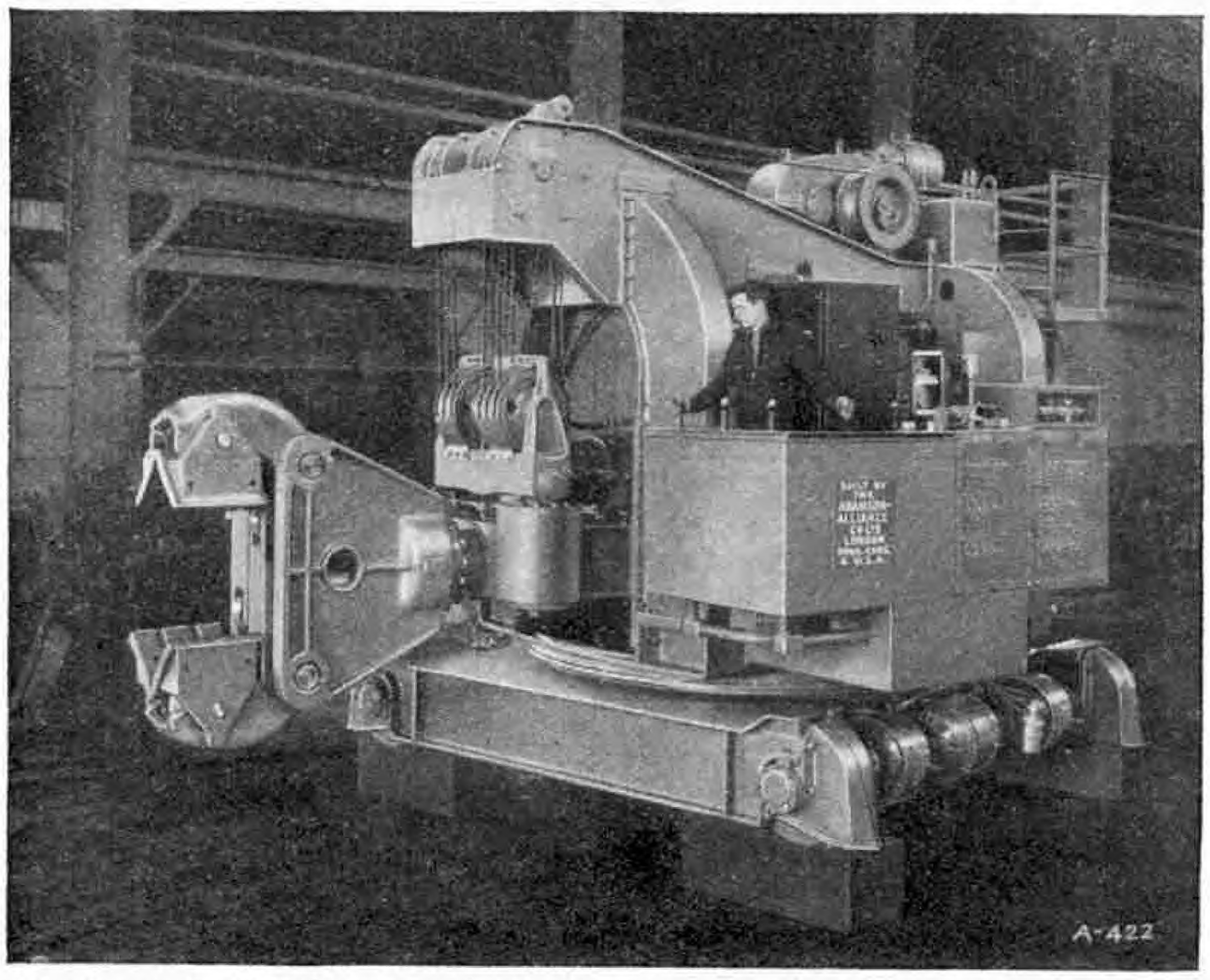
Two fine new express motor liners, the "*Argentina Maru*" and the "*Brazil Maru*," have recently been placed in service by the Japanese shipping line Osaka Syosen Kaisya. Both ships were built in Japan and are designed for carrying cargoes between that country and South America and for the transport of emigrants. The hulls of the liners are similar and have a length of 508 ft. Each vessel has a gross tonnage of 12,755, and its equipment throughout is of the latest type.

Machine for Handling Heavy Forgings

The lower illustration on this page shows a machine designed specially to eliminate the hard work of handling heavy forgings. It is known as a Forging Manipulator and is manufactured by the Adamson-Alliance Co. Ltd., London E.C.3. Only one man in addition to the operator is necessary when it is in use, and the work of this attendant is more or less of a supervisory nature, for the Manipulator takes care of all the handling of the heavy ingots.

The forging is gripped between powerful jaws or tongs fitted to a movable arm mounted on a trolley that carries also all the other mechanism and runs on rails laid in the floor. The arm can be raised, lowered or travelled in or out from the trolley, and in some machines it is provided also with revolving motion. The machines can be used either for handling the ingot while under the press or for loading and withdrawing ingots from the furnace. One or two Manipulators working in conjunction with a forging press or a hammer, will turn out a large quantity of forgings in a few hours.

A number of different types of Manipulators are available to suit varying conditions, and nearly 100 of these machines have now been designed and installed. They are being used for many different kinds of forging including axles, die blocks, heavy shafting, and many types of commercial work.



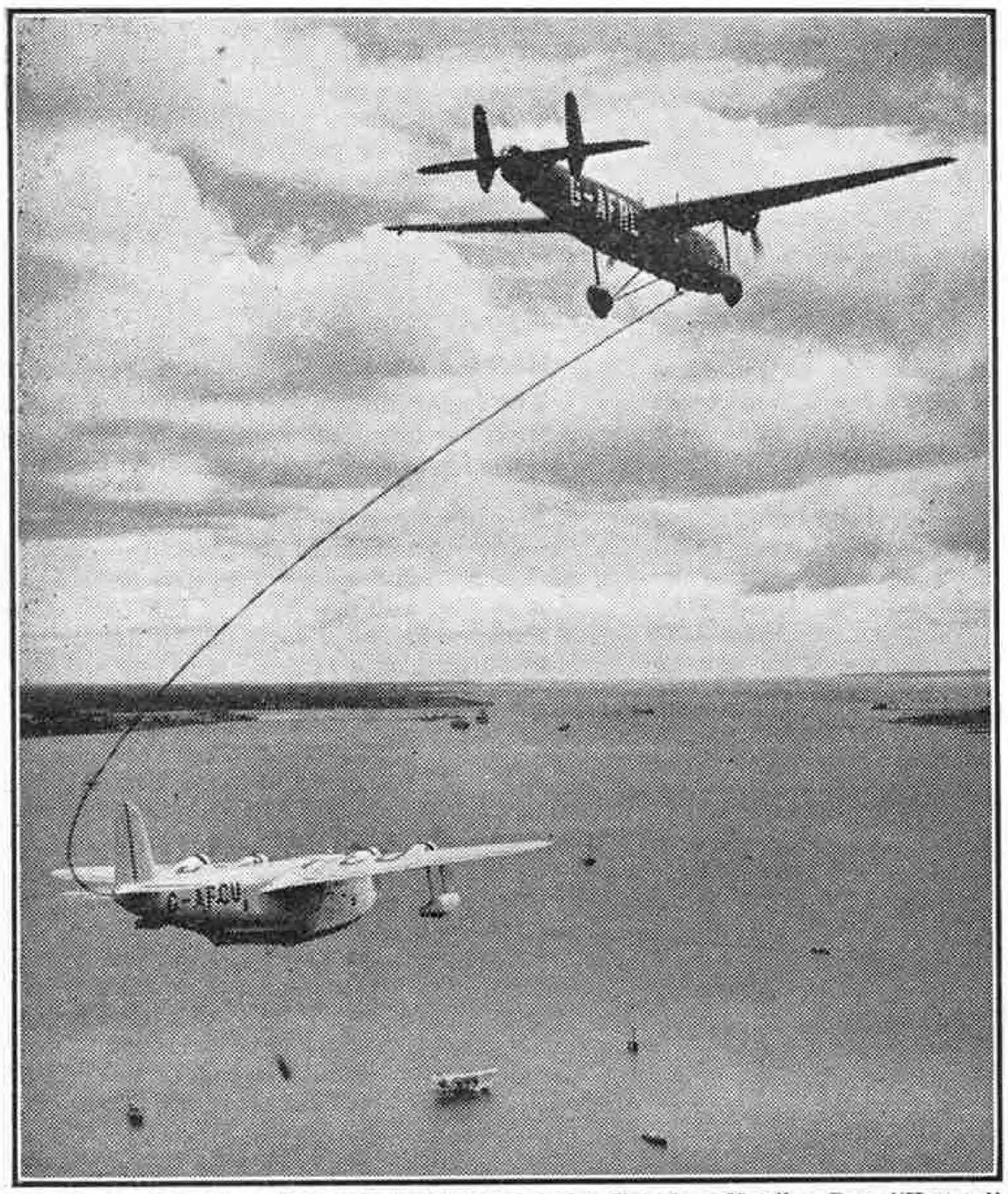
A forging manipulator of the type referred to on this page. It is manufactured by the Adamson-Alliance Co. Ltd., London, to whom we are indebted for this illustration.

Refuelling an Aeroplane in Flight

Notable Success of Sir Alan Cobham's Scheme

AS long-distance air transport increases and still greater loads have to be carried, the main air line companies may have to adopt means of assisting their heavily-loaded aircraft to take off from the airports. Assisted take-off enables an aeroplane to carry a load greater than it can do if it has to get into the air unaided, and once the machine is in flight it can carry its heavy load with ease.

One method of supplying this aid is to catapult the air liner into the air. In another method, invented a few years ago by Major R. H. Mayo, the heavily-loaded aircraft is mounted on the back of a larger and lightly loaded one, and released from this when the composite aircraft has attained a suitable height and speed.



The Empire flying boat "Cabot" being refuelled during flight by a Handley Page "Harrow" tanker aircraft.

A third interesting method, which is described in this article, is to offset the heavy load of passengers and freight by only partly filling the petrol tanks before the take-off, and completing the fuelling immediately the machine has climbed to a safe operating height. This scheme is called "flight refuelling," and it has been developed by Sir Alan J. Cobham, the famous airman, after eight years of research and experiment.

Sir Alan won fame by long-distance flights to various parts of the Empire, between 1925 and 1930. On these flights he often had to take off from temporary aerodromes and hastily improvised runways, and the task of getting his machine, heavily loaded with petrol, into the air from them was difficult and dangerous. In 1931 he began to consider the possibilities of refuelling in the air as a means of removing this risk on long-distance flights. His first experiments were carried out in 1932 with two D.H.9 biplanes, and early the next year with a D.H.9 and a Handley Page W.10 transport. In these experiments the aeroplane requiring more petrol took off and then manœuvred into a suitable position to receive it from the tanker aircraft. A flexible hose was lowered from the tanker, caught by one of the crew of the machine to be fuelled, and coupled by him to a connection that ensured the safe flow of the petrol into the tanks of the receiving machine.

Sir Alan got the Air Ministry interested in his scheme, and with their co-operation a non-stop flight to India was arranged, during which his machine would be refuelled at intervals by Service aircraft temporarily converted to act as aerial tankers. He bought an Airspeed "Courier" single-engined low wing monoplane for the flight, and had the wing structure strengthened to increase the all-up weight of the machine to over 5,050 lb. after refuelling in the air, instead of the normal maximum of 3,700 lb. with unassisted take-off. As the manœuvring into position for refuelling during flight was to be done by the "Courier," written instructions were considered enough to enable the R.A.F. crews to meet Sir Alan's machine at pre-arranged points, make contact, and transfer the fuel, without any previous practice on their part.

The "Courier" took off from Portsmouth with its maximum permissible take-off load, but with only partly-filled petrol tanks; and fuelling was completed in the air over the Channel from the Handley Page W.10 already mentioned. Another Handley Page had already been flown out to Malta and was able to refuel Sir Alan's monoplane as it passed that island. From there onward the replenishing of the fuel supply was to be done by R.A.F. aircraft. Unfortunately, very soon after the Malta operation the throttle of the "Courier's" engine broke, and Sir Alan had to turn back. He managed to land his machine safely on the island by accomplishing a long flat glide of several miles, made flatter by virtue of the retractable undercarriage, in spite of the heavy load of petrol on board. Owing to the fact that he only had a foot to spare when he cleared the boundary wall of the aerodrome it was impossible for him to lower his undercarriage. However, a very successful landing was made on the aerodrome with the wheels up. The non-stop aspect of the flight had to be abandoned, but very useful experience had been gained.

In 1934 Sir Alan formed a company called Flight Refuelling Ltd. to organise and extend development work on his system of refuelling in the air, and the Air Ministry provided two larger aircraft, Vickers "Virginias," for a further stage of experiment. Imperial Airways also became interested, and in 1936 successful demonstrations were given before the directors of that company to show the progress achieved in experiments with the "Virginias."

Then faster and more powerful aircraft were made available to Sir Alan's company, and early in 1938 a very important series of experimental refuelling flights was carried out above Southampton Water, with an Armstrong Whitworth 23 transport as the tanker aircraft and the Empire flying boat *"Cambria"* as the receiver of the petrol. The tests were made under very varied conditions that included rain, low cloud, storm, and fog, and showed that flight refuelling can be done whenever it is possible to operate air transport.

The climax to the years of research and experiment by Flight Refuelling was the introduction of the British transatlantic air service last summer, which served also as the first full-scale experiment in refuelling a scheduled service; and as far back as June 1938 Flight Refuelling Ltd. were busy on problems connected with their part of the scheme. The modified "C" class Empire flying boats then being built for the service had been designed to have refuelling gear, and were to take off at 46,000 lb., the weight being increased to 53,000 lb. by refuelling in flight.

For this transatlantic service Handley Page "Harrow" bombers lent by the Air Ministry were converted into tanker aircraft, each with a cargo capacity of 8–900 gall. In April 1939 the first two of them, partly dismantled, were shipped to

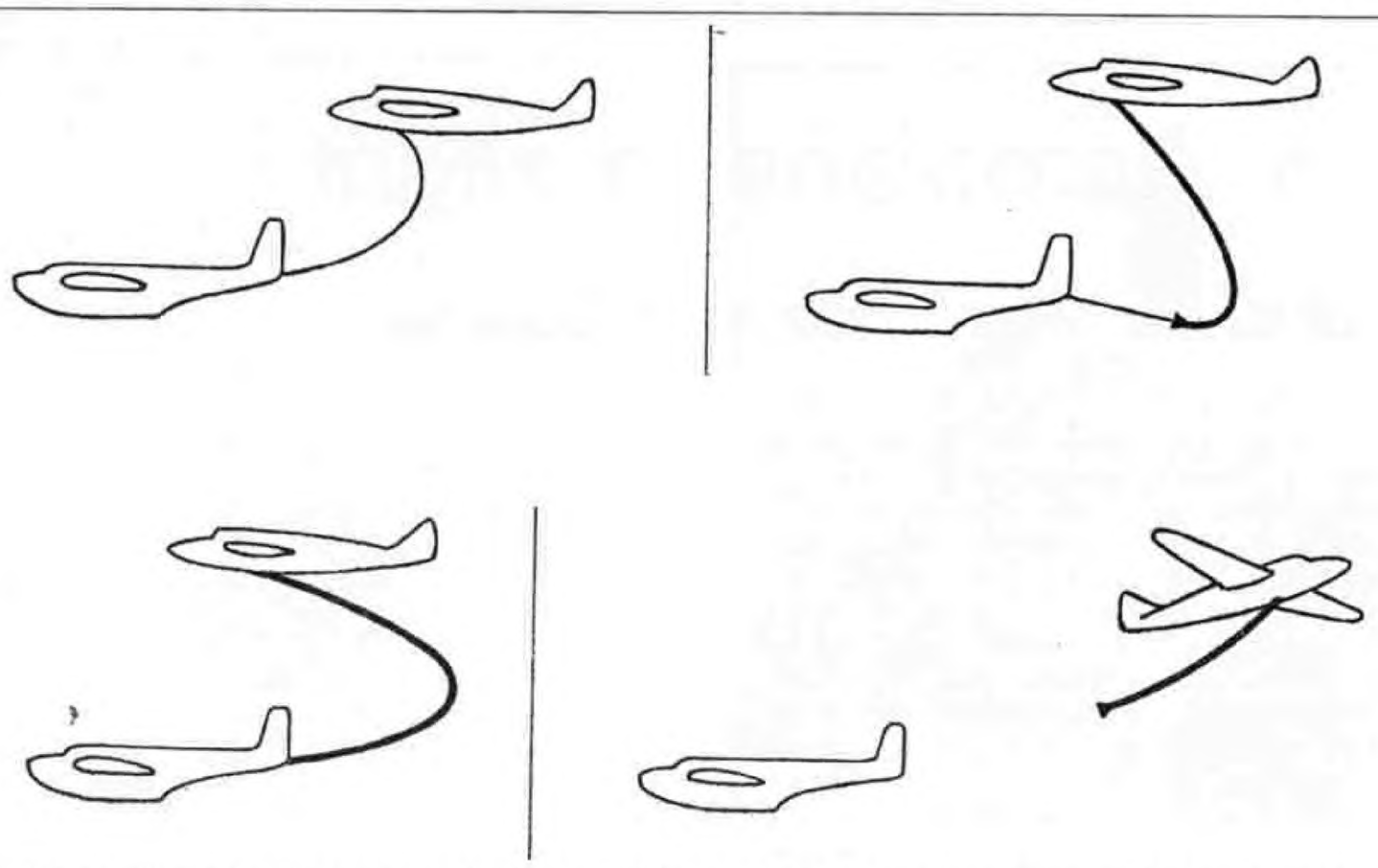


Diagram illustrating the four stages in flight refuelling. Top left, the two aircraft connected by the hauling cable; top right, the flexible hose-pipe being drawn toward the coupling in the stern of the receiver aircraft; bottom left, the hose-pipe in position and refuelling in operation; bottom right, refuelling completed.

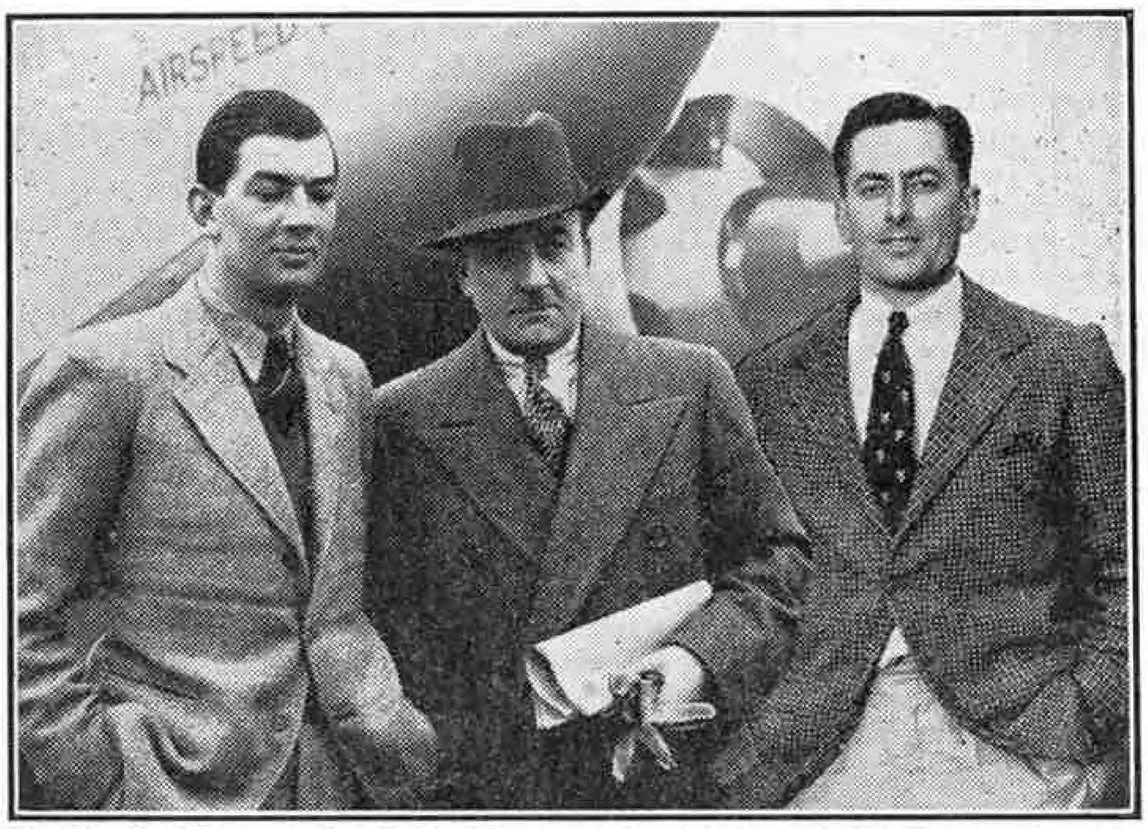
Montreal on board the C.P.R. steamship "*Beaverford.*" They were accommodated on the forward and aft decks respectively, and were the largest aircraft ever shipped as deck cargo. At Montreal they were lowered into lighters and then wheeled ashore to the nearby Fairchild Field aerodrome, and after assembly were flown to Newfoundland airport. The machines were complete with crews and equipment by the third week in May, well in advance of the beginning of the service. The delivery of the aircraft to Newfoundland and the organising of Flight Refuelling's depot there were in charge of Flight Lieut. Johnson, of the company.

In the meantime Flight Refuelling were training in England Imperial Airways crews for the transatlantic flying boats, and each crew was given about four hours flying experience of the refuelling process. The first officer of each boat was to be in charge of the refuelling operation, and he was to be assisted by the second wireless operator. The captain, or pilot, of the flying boat required no more than ten minutes verbal instruction, as he had only to fly a straight and level course during the operation. In actual practice the automatic pilot had charge of the flying boat on more than one occasion during the whole time that fuel was passing. The "Harrow" tanker used during the training flights was afterwards flown to an air base in Eire in time for the opening of the service. It was in charge of Flight Lieut. Tyson, who there carried out the refuelling of the westbound Empire flying boats.

The transatlantic service began on 5th August 1939, when the Empire flying boat "*Caribou*" departed on the first westbound flight; and it ended with the arrival of the last eastbound boat, "*Cabot,*" at Southampton on 1st October that year. During the two months of operation 16 Atlantic crossings were made, one in each direction weekly, and refuelling in the air took place on 15 of the flights. The exception was the first eastbound trip, when a very strong westerly wind enabled the pilot of "*Cabot*" to cross from Newfoundland to Eire in about 10 hrs. and to arrive there with enough petrol left to enable him to fly home to Southampton.

As might be expected, a few small mechanical defects were found and some mistakes made in the operation of the earlier refuelling flights, but they were never enough to prevent the process being completed in good time. The last 10 flights were successful in every detail, and there was not a hitch of any sort. The average time between making contact and turning on the petrol was five minutes, and the passing of the 800 gall. of petrol took seven to eight minutes. The average rate of flow therefore was about 110 gall. per min., the delivery being by gravity from an 80 ft. head.

The flight refuelling of the Empire flying boats was done by the "Ejector" method developed by Sir Alan Cobham and his company, and the diagram on this page gives a general idea of the process. In detail it is as follows. When the heavily laden aircraft, with its partial supply of petrol, has taken off and climbed to a suitable height, it pays out a 10 cwt. steel guiding or hauling cable through a special coupling in its stern. A heavy weight at the free end of the cable causes this to curve downward as it trails behind the machine. The pilot of the tanker flies



Sir Alan J. Cobham, with Flt. Lt. Johnson on his right and Flt. Lt. Tyson on his left. Photograph by courtesy of "Flight."

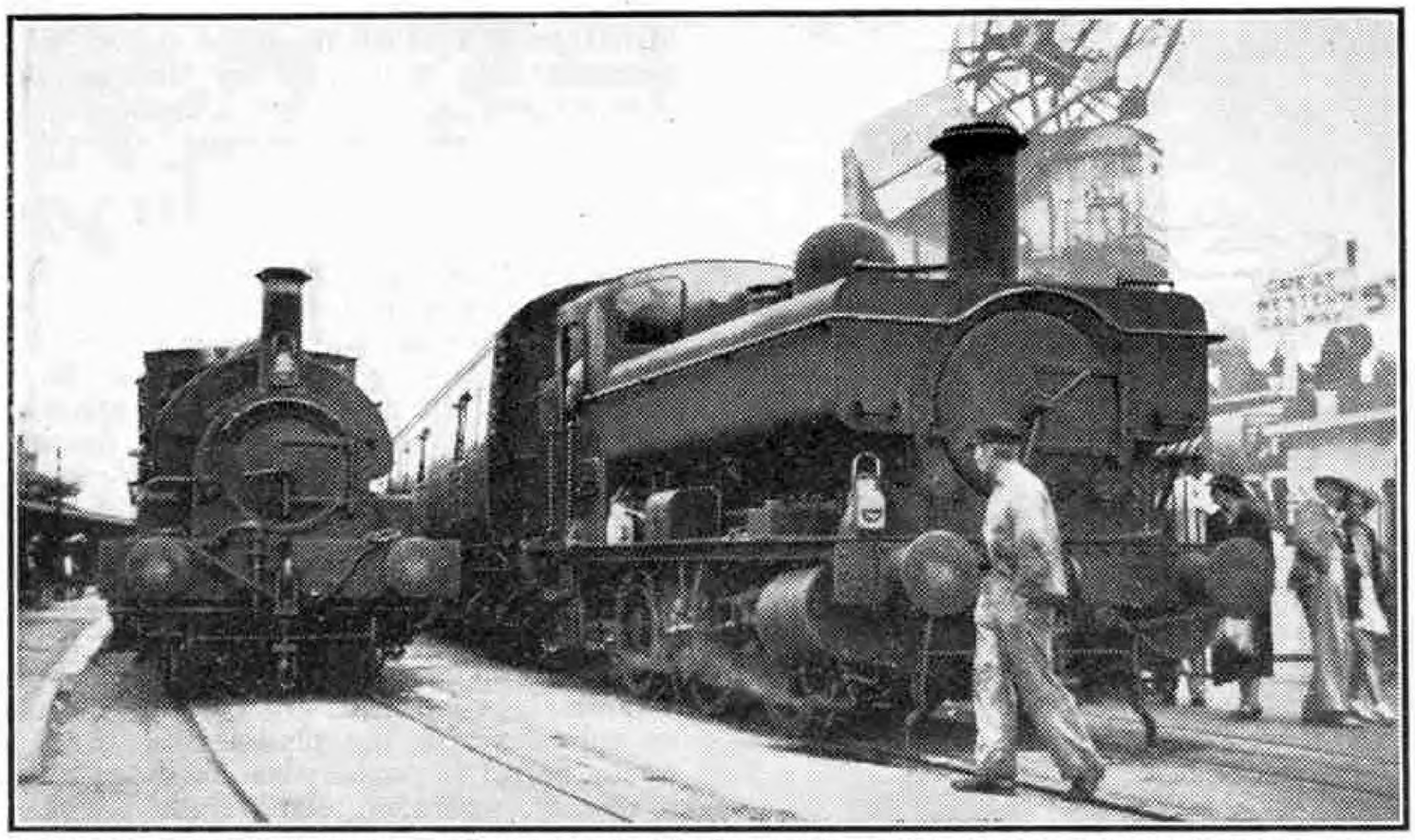
opposite to the curving line, and by pressing a button causes an ejector or line-throwing gun aboard his aircraft to fire a harpoon-like projectile and strong steel cable through an opening in the side of the fuselage. This second line speeds into the arc of the first one, and when spent drifts back against it, slides down, and engages with a grapnel on the weight. The grapnel holds the second line and thus establishes contact between the two aircraft.

Until now the tanker has been a little below the receiving aircraft, but at this stage it climbs above it, though still keeping a short way behind and to one side of it. The lines—the tanker cable brings the other with it—are wound up through a hatchway in the floor of the fuselage nose, the weight is detached from the hauling cable by means of a special quick-release fitting, and the cable is plugged into a nozzle at the end of the petrol hose aboard the tanker. A signal is given to the receiving aircraft, which then winds in the hauling line, and of course pulls down the hose, drawing the nozzle into the coupling in the fuselage stern. There the hose nozzle is connected to the pipe leading to the main petrol tanks. Hydraulic mechanism remotely controlled clamps the coupling into a petrol-tight position.

A quick flushing of the hose and petrol pipe with the inert gas nitrogen follows. Then at a further signal the tanker releases the petrol, and the fuel passes down the long curved hose and into the receiver aircraft at some 110 gall. per min. Special valves fitted in the tanks automatically shut off the petrol as each tank becomes full.

When refuelling is completed the hose and pipes are again flushed with nitrogen under pressure. Then, as the nozzle of the hose is detached from the coupling, sprays of methyl bromide, a fire preventative, flood the coupling, to remove all risk in the event of a static discharge occurring at this point. The hose is wound back into the tanker, and by a special arrangement of a weak link the contact line is not severed until the hose nozzle is about 300 ft. behind the receiver aircraft.

An alternative method of flight refuelling developed by the company is called "Taking-off in contact." As the name indicates, the two aircraft take off at the same time, and are connected by a light line that extends from the wing tip of the tanker to the reception coupling of the receiver machine. When the aircraft are in the air the line is released from the wing tip and is used to pull the main hauling cable across from receiver to tanker. This in turn is used to haul the flexible hose-pipe across, as in the Ejector method. The transfer of the hauling cable across to the tanker can begin the moment the aircraft have left the ground, and in this way as much as one and a half minutes may be saved in the period of refuelling, and three minutes in the total flying time of the tanker per operation. Also, if both tanker and receiver are working from the same aerodrome, there is the added advantage that no time is lost in making the rendezvous in the air.



An interesting scene at Weymouth Docks on the G.W.R. showing on the left a dock shunting engine, with a "Pannier" tank on the right. Prize-winning photograph by M. Worsfold, Ashtead.

Railway News

L.N.E.R. Locomotive Classifications Explained

This company's plan is most helpful, as each letter in the classification definitely indicates a certain wheel type. Following the letter comes a number indicating the class within the letter-group, the extent of the variations being governed by the stock of different kinds of engine and their suitability for different parts of the system. The general scheme of numbering in each class is to put former Great Northern engines first. Then come Great Central, Great Eastern, North Eastern, North British and Great North of Scotland locomotives, in that order wherever existing, and these are followed by new standard L.N.E.R. designs. Tank engines follow, in the same order when applicable, after each tender series has finished, blank numbers being left for additions at different stages.

All 4–6–2s are class A. The "Pacifics" of Doncaster origin are A1, A3 and A4. Class A2 is now blank. As there are no other 4–6–2 tender locomotives, either tender engines or tanks, of G.N. origin, A5 is allotted to the G.C., A6 and A7 to the N.E. types built as such, and A8 to the 4–6–2T, which are mainly rebuilds from the N.E. 4–4–4T class now extinct.

Every 4–6–0 is of class B, and all are tender locomotives. Classes B1–9 include G.C. express and mixed traffic engines. B12 covers G.E. 4–6–0s, engines of classes B15–16 are of N.E. origin, and B17 is the classification for the L.N.E.R. "Sandringhams."

Class C covers the 4–4–2 types. The former G.N. large "Atlantics" are C1, and the still remaining small-boilered ones are C2. Those of G.C. construction are C4, with the exception of the four compounds, which are classed C5. The older N.E. Atlantics are C6 and later three-cylinder Raven class C7. Of the latter Nos. 727 and 2171, rebuilt with articulated booster, are C9. The N.B. 4–4–2 engines, of which one remains, although on the withdrawn list, were C11. The 4–4–2T groups follow immediately, beginning with G.N. Ivatt engines, and so to the G.C. and N.B. Locomotives.

Class D, indicating the 4–4–0 type, is a good example of the scheme. It begins with D1, D2 and D3, covering respectively the large, standard and small G.N. designs, and a long list as regards pre-grouping types ends with the Great North of Scotland class D42. The L.N.E. three-cylinder "Shire" and "Hunt" engines are D49. There are no remaining 4–4–0Ts on the L.N.E.R.

E implies the 2–4–0 type, of which the 20 G.E. engines of class E4 are the sole survivors.

The following classes consist of tank engines only: F1–7, 2–4–2; G5, G9, G10, 0–4–4; H2 covers the eight 4–4–4Ts formerly owned by the Metropolitan Company, and now merged with others mentioned below in the stock of the L.N.E.R., G.C. section. L indicates 2–6–4, 20 G.C. mineral engines being L1 and 6 ex-Metropolitan tanks L2. Metropolitan locomotives are found also in the M range, 0–6–4, Nos. 6145–53 being M1, and Nos. 6154–7 M2. N1 indicates the smaller Doncaster classes and N2 the large superheated Gresley standard type, and so on to the well known N.B. N15 type, the letter indicating the wheel arrangement 0–6–2. Classes S1 and T1 have only one representative each, their wheel arrangements being respectively 0–8–4 and 4–8–0. These are banking engines. The Sentinel and "tram" engines are included with other small shunters in the 0–4–0 Y class, and class Z covers a few old 0–4–2Ts in Scotland.

The most numerous class is that indicated by the letter J, the wheel arrangement being 0–6–0. J1–37 are tender pre-grouping classes and J38–9 are L.N.E.R. classes. The 0–6–0Ts range from J50 to J83. The 2–6–0s are indicated by letter K, and are represented by the three Gresley classes K2–4. The 2–8–0s fall in P classes, P1 covering the two "Mikado" mineral engines and P2 the six other 2–8–2s of the "*Cock o' the North*" express type. In class Q, 0–8–0, U1 is the powerful "Beyer-Garratt banker" No. 2395. W1 is another class with a single engine, "No. 10000." Lastly of the new standard 3-cylinder 2–6–2 Ts, the original type is V1 and the latest series, carrying a boiler presure of 200 lb. per sq. in., is V3. Contrary to the general plan the tender engines of this wheel arrangement come in between, as they were designed after the first tanks. Thus the "Green Arrows" are V2.

There are some non-standard engines taken over from the Midland and Great Northern joint stock, carrying numbers prefixed by a "O" which have their own single letter classification such as "M and GN A."

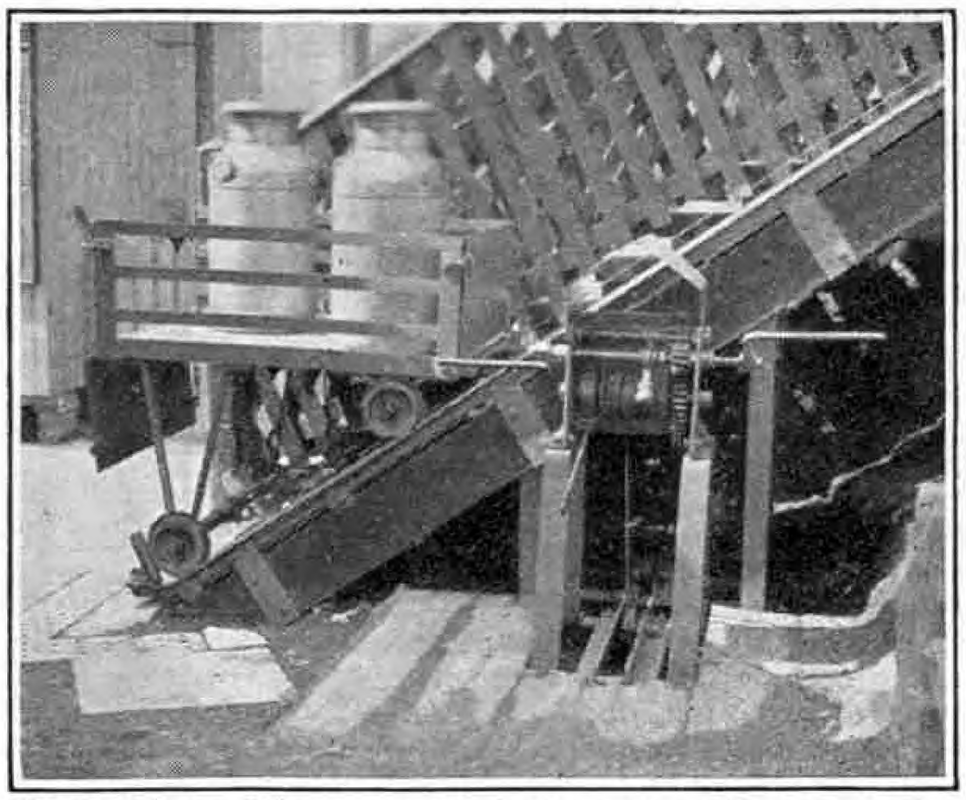
Further numerical sub-divisions are made officially to indicate rebuilds or later editions of a class. For example, B12/3 describes Gresley rebuilds of the former G.E. B12 4–6–0 engines.

With a few useful exceptions the engine numbering is not so well ordered. Whole classes are not necessarily numbered consecutively, on account of blank numbers being filled when new locomotives were turned out in some cases irrespective of type.

Southern Tidings

Two old engines of the former L.S.W.R. design were withdrawn during May. They were No. 185, of the small 0–4–4T "02" type, and No. 684, one of the two remaining "T6" Adams outside cylinder 4–4–0 express engines. "Schools" class locomotives 917 "*Ardingly*" and 934 "*St. Lawrence*" have been fitted with large diameter chimneys in conjunction with Lemaitre blastpipes. The appearance of the latter engine has been enhanced by the provision of a rim round the new chimney, as on the "Lord Nelson" class. The relettering of engines in the new style, with cab numbers, is continued as the locomotives go through the shops.

A familiar landmark has temporarily been removed from the concourse of Waterloo station, London. It is the old Bodmin and Wadebridge Railway coach, built about 1836, which in recent years has been mounted on a pedestal as an exhibit.



The foot of the milk can conveyor at Abernethy, on the L.N.E.R. line between Ladybank and Bridge of Earn.

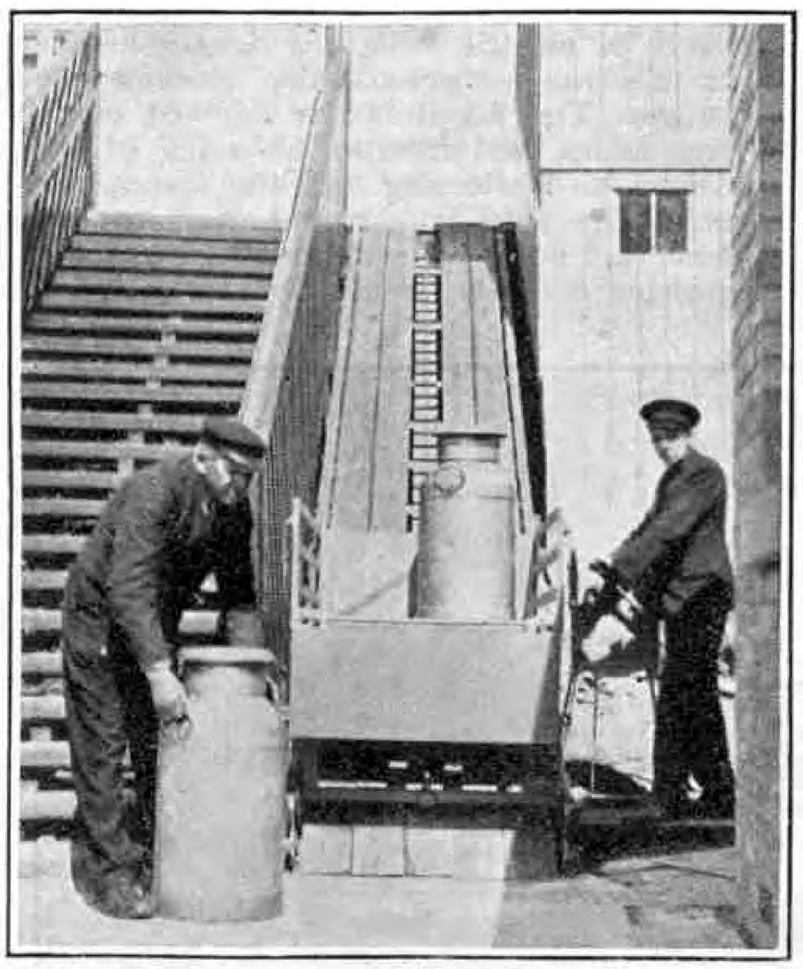
A Milk Can Conveyor on the L.N.E.R.

At Abernethy, on the branch from Ladybank to Bridge of Earn, there is considerable milk traffic in connection with the local cheese-making factory of the Scottish Milk Marketing Board. Seven years ago, when the railway was converted from double to single line working, the north platform adjoining the goods yard at Abernethy was removed. Owing to there being no access from the goods yard roadway to the south platform now in use, milk cans cannot be unloaded at platform level, but have to be dealt with first at the lower level of the booking office and then raised to the platform level, a height of over 10 ft.

To facilitate the handling of full milk cans, each weighing about 130 lb., the Engineer's Department have recently designed and constructed the conveyor shown on the accompanying photographs.

On a runway inclined at about 30 deg. to the horizontal, a small steel-framed car is pulled by a wire rope running to a pulley at the top of the conveyor and thence below the structure to a hand-operated winch. A brake on the winch allows the car to be lowered from the platform level at a controlled speed. A simple safety device has been provided under the car by fitting a steel plate, pivoted to bear against the wire rope. Should the rope break, the plate is free to rotate and engage a rack in the centre of the runway, thus stopping the car.

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Another view of the conveyor at Abernethy, our illustrations of which are reproduced by courtesy of the "L.N.E.R. Magazine."

L.M.S. Locomotive Named "Home Guard"

The first engine-naming ceremony since the outbreak of war took place at Euston Station, London, on 30th July last when the L.M.S. "Patriot" Class (5XP) 4–6–0 No. 5543, which is stationed at Carlisle, was christened *"Home Guard"* in honour of the Local Defence Volunteer corps. The ceremony was performed by Lt.-Gen. Sir Henry Pownall, K.B.E., C.B., M.C., Inspector-General of the Home Guard. A guard of honour more than 40 strong was mounted by the Euston L.M.S. Section of the Home Guard, and both the enginemen in charge of No. 5543 for the occasion, Driver L. Y. Pile of Camden, and Fireman W. J. Osbourne of Willesden, are members of the Home Guard.

Presiding at the ceremony, Lord Stamp referred to the "immediate and inspiring" response to the call for railwaymen to enrol in the Home Guard for the defence of vulnerable points on the railway, and he mentioned that no fewer than 46,000 men of the L.M.S. had volunteered for Home Guard service. He stressed the value of the *esprit de corps* of the railway service as a wartime asset, and said that of the Companies now formed in the L.M.S., 75,000 men joined the Forces in the last war, and that of the 65,000 of them who returned more than 40,000 are still in the service, and about half of these have so far joined the Home Guard. More than 15,000 L.M.S. employees are now serving with the Armed Forces or in whole-time Civil Defence. D. S. BARRIE.

Giant "Garrats" in Kenya

Twelve giant Beyer-Garratt locomotives in service on the Kenya and Uganda Railway in British Africa are the first 4–8–4 × 4–8–4 engines ever built. There the track is of metre gauge, that is about 3 ft. 3 in., and it is laid with light type of rails in territory presenting severe grading and curvature. These exceptional engines are exceedingly light in weight on any one axle, the maximum being 11¾ tons, and their tractive effort is calculated at 40,670 lb. The weight in working order is 186 tons. The coupled wheels are 4 ft. 6 ins. in diameter. The cylinders, four in all, are 16 in. in diameter with a stroke of 26 in., and the total heating surface is 2,750 sq. ft. The engines are manned by natives on long journeys in a very hot climate, and have proved a great success.

Coal to the Fore

On account of the need for creating large reserve stores in all parts of the country, as well as of replacing a good deal of normal coastwise sea transport, the British railways are at the present time conveying record quantities of coal for a summer season. Over 2,000 special coal trains have been worked during the last four months, wagons having to be returned empty. Various classes of passenger and mixed-traffic engines have been helping with these heavy duties in order to supplement the stocks of mineral locomotives.

Strange Locomotive Combinations

Wartime traffics often do not balance in opposite directions to the same extent as in normal times, and have produced numerous quaint combinations in the way of two engines working one train. In many cases one of the two engines concerned is working home or proceeding to another duty, and is not necessarily attached because assistance is needed. On the L.M.S. St. Albans-Watford branch one of the large modern 2–6–4T with a three-coach train was piloted by a former L.N.W. 0–6–2 coal tank. L.M.S., G.W.R. and L.N.E.R. 0–6–0 engines have been seen in combination on the Great Central and Great Western joint line in Buckinghamshire. The L.M.S. locomotives were on loan to the G.W.R., and certain traffic is operated jointly by the latter Company and the L.N.E.R.

Out of Gauge Loads

The flexibility of railway goods traffic



S.R. No. W 20 "Shanklin," one of the Adams 0-4-4 tank locomotives allocated to the Isle of Wight section. The hooter with which all the I.O.W. engines are fitted is prominent in front of the cab. Photograph by A. Audsley, Cobham, Surrey.

organisation has recently been tested by a number of extremely heavy and bulky pieces which had to be conveyed across country, often over more than one Company's system. It is sometimes necessary for adjoining lines to be kept clear the whole way, and for the journey to be spread over more than one Sunday in order to interfere as little as possible with ordinary services. This was the case when a 50-ton hot metal ladle, 18 ft. long and 11 ft. in diam. was carried from Scunthorpe to Ebbw Vale, Monmouthshire; and also when a load of 57-ton girders was transported from Middlesbrough to Chelsea.

Frequently these difficult propositions can be kept within the limits of the normal loading gauge by the use of one or more of the specially designed long, low wagons which the Railways now have available. In some cases these wagons enable the bases of large loads to be secured in a "well" only a few inches above rail level. On the L.N.E.R., one set of five vehicles running on 56 wheels is capable of sustaining a load of 150 tons, with runner wagons on each side of that sustaining the main load. There are several thousand other specially equipped or shaped wagons which will accommodate almost any piece or package however awkward in size or shape.

A Giant Removal by Train

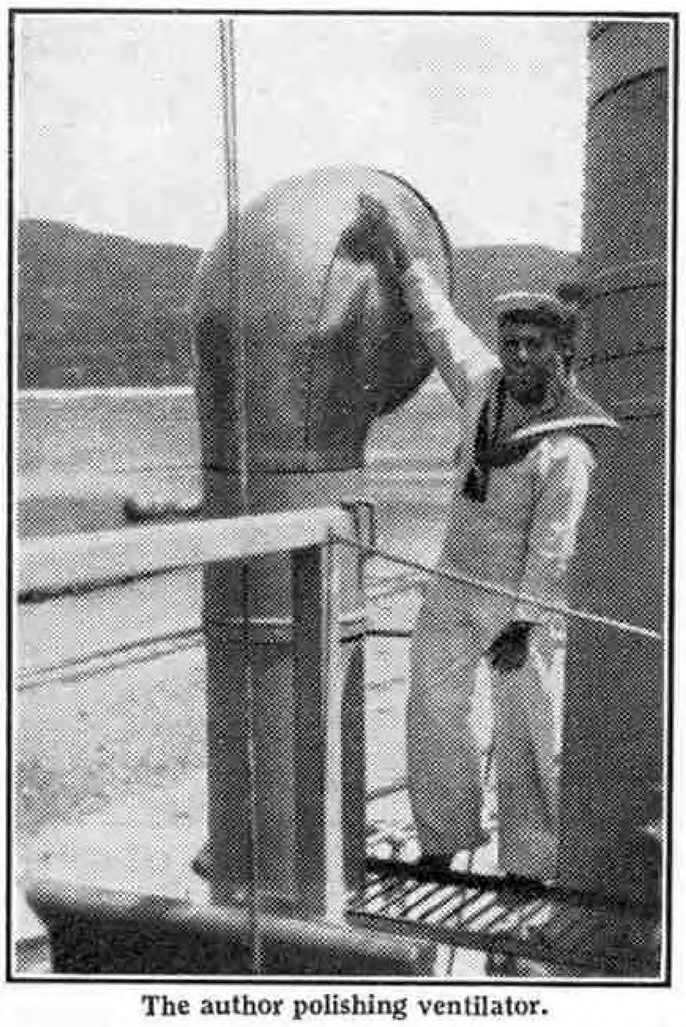
When Cheltenham School recently returned from Shrewsbury to its home buildings, which had been temporarily occupied by the Government, the whole of the removal was carried through by the G.W.R. There were 350 boys as well as masters to be conveyed, with over 700 sacks of personal belongings, many bicycles and large quantities of equipment and stores. All the goods and chattels were conveyed in 25 covered containers by special train and cartage direct from the respective houses of the temporary quarters to the new ones.

* * * *

The longest continuous rail in service is 7,700 ft. in length and is in the track of the Delaware and Hudson Railroad near Schenectady, New York.

Eight Bells and All's Well

By Ex-Instructor Claude White



The author polishing ventilator.

IT is one minute to 12 somewhere on the high Seas. A ship is ploughing her way slowly through the dark water, and from her bridge the only lights visible are a pale gleam from the compass binnacle and a dim suspicion of red and green from the port and starboard navigation lights. Except for the creaking of the mast and the wash of the sea on the bows there is no sound. Suddenly the silence is broken by eight strokes of a bell and a distant voice from the forward look-out can be heard "All's well." It is midnight. This is a typical night scene in any one of the many British ships either of H.M. Navy or the Mercantile Marine that are to be found attending to their lawful business upon the sea.

We are a seafaring nation and the safety of ourselves and of our Empire depends upon the freedom of the sea. It is not surprising therefore to find many of us at this time showing an interest and a curiosity about those "who go down to the sea in ships," particularly those in the Navy.

Let us examine some of the less known routine duties of the crew that are necessary for the working of one of H.M. ships of war.

In common with his business counterpart ashore, no member of the crew will get very far without being able to tell the time; but time at sea is not referred to in the same way as it is ashore. The day of 24 hours is divided into seven watches, as follows:

Midnight to 4 a.m., Middle Watch; 4 a.m. to 8 a.m., Morning Watch; 8 a.m. to Noon, Forenoon Watch; Noon to 4 p.m., Afernoon Watch; 4 p.m. to 6 p.m., 1st Dog-watch; 6 p.m. to 8 p.m., 2nd Dog-watch; and 8 p.m. to Midnight, 1st Watch.

The time is denoted by striking a bell every half hour. One stroke of the bell is given at 4.30, 8.30, 12.30; and one more stroke is added for each half hour until 8 bells are reached at 4; 8; and 12. The two dog-watches do not follow this rule, 6.30 p.m. being one bell, 7 p.m. two bells, and 7.30 three bells. Eight o'clock, however, is always 8 bells. The idea of introducing the dog-watches between 4 p.m. and 8 p.m. is to ensure that there is an odd number of watches in the 24 hours, thus making the men change their watches every day.

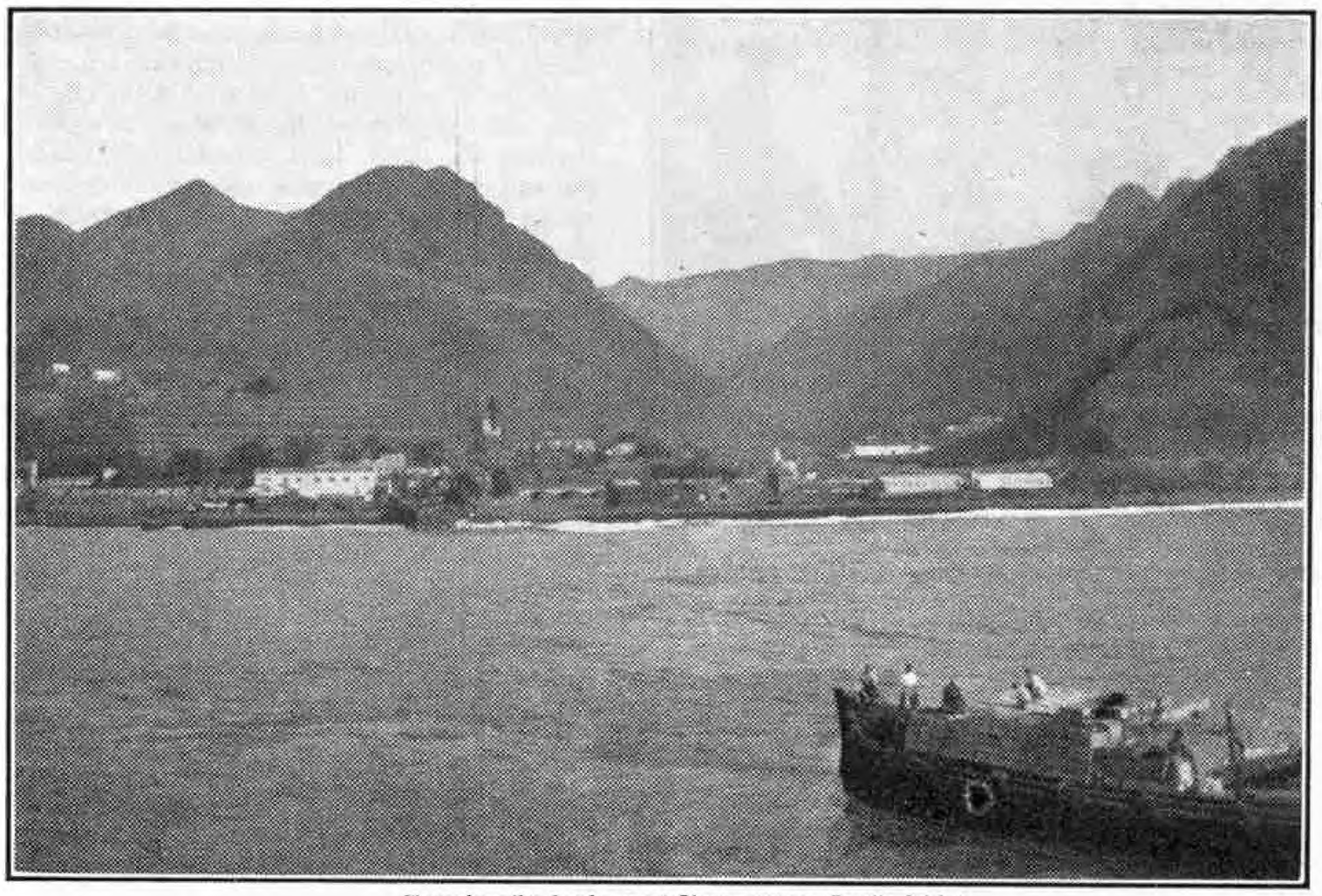
When a ship is commissioned the seamen are divided into two watches, Starboard and Port, each of which is again divided into two "parts"; 1st part and 2nd part; and these are further divided into two "sub-divisions." Each watch is divided into four "parts of the ship," Forecastlemen, Foretopmen, Maintopmen and Quarterdeckmen, except that in some cases the King's Company are divided into three watches instead of two, and have three parts of the ship, Forecastlemen, Topmen and Quarterdeckmen.

At sea one watch or part of a watch is always on deck, day or night, but in harbour watches are on deck during working hours, after which one watch remains on duty for any work that may be necessary, while the other is free either to go ashore or attend to their private affairs, whichever they may choose. These latter are called "liberty men," and if they decide to go ashore they must first pass an inspection. At this muster any man who is dirty or untidy, or in any other way would fail while ashore to do credit to his ship, is sent back to correct the fault. If a ship is not moored alongside a jetty, and a "liberty boat" is necessary to take the men ashore, this will have gone long before the man has time to adjust himself. Thus, although permission to land is not actually refused, this end is still achieved, particularly in a small ship, by the fact that as a rule there is one liberty boat and no more. However, it is a very rare occurrence to find a man in so unfortunate a position as this.

The "parts of the ship" of the watch on duty are detailed off to their corresponding section for cleaning purposes, closing watertight doors, and so on. When the ship is at sea the watch on deck is responsible for various duties, called "Tricks" one of the most important and obvious of which is the Lookout. By day, that is from daylight to sunset, he is placed at the masthead or in the "Crow's nest" as it is commonly termed. He reports to the Officer of the watch all vessels, land, rocks lighthouses, etc., that he sights, stating the bearing of the object. He is relieved every hour, after which he reports to the Officer of the watch: "Masthead man relieved," and whether anything is in sight or not, and if so, its bearing.

By night, that is from sunset to daylight, the same duty is carried out by lookouts stationed on the bridge. These also are relieved every hour, and on being relieved they report in the same way as the masthead man, with the additional information "Lights Bright and All's Well," or otherwise. The lights referred to are the bow and steaming lights. The lookouts report every time the bell rings, singing out "Starboard Lookout" or "Port Lookout," as the case may be. In a fog, falling snow or thick weather, one man is placed low down and another high up in order to see under or over the blanket, for this is often possible. The lookouts must never leave their posts, and must point out to their reliefs all objects in sight.

The most important trick is probably that of the helmsman, whose duty it is to steer the ship under the supervision of the Quartermaster. This duty does not call for the muscle it did in the old days when the wheel was geared directly to the rudder, necessitating a great deal of strength to move it. Nowadays the steering wheel merely opens, closes or reverses a steam valve or electric switch, a donkey-engine or electric motor actually moving the rudder. The helmsman is relieved every two hours, and informs his relief of the course he is steering and the amount of helm the ship is carrying, The course, however, both by standard compass and steering compass, is usually marked on a



Entering the harbour at Simonstown, South Africa.

slate hanging near the binnacle.

The engineroom telegraph and revolution indicators and their familiar "ting ting" are known to us all. They are operated by telegraphmen stationed on the bridge, as ordered by the officer of the watch.

We will now leave the bridge and look round at some other parts of the ship.

On the upper deck we find the sea-boats crew, ready to man the sea-boat instantly. They consist of a cutter's crew taken from the watch on deck, and they fall in separately when the watch or both watches fall in. It is worthy of note that a second boat's crew is told off from the watch so that the other sea-boat may be quickly manned if required. The sea-boat lowerers muster with the sea-boat's crew and consist of a leading seaman of the fore and maintop, and two hands of each of those parts of the ship.

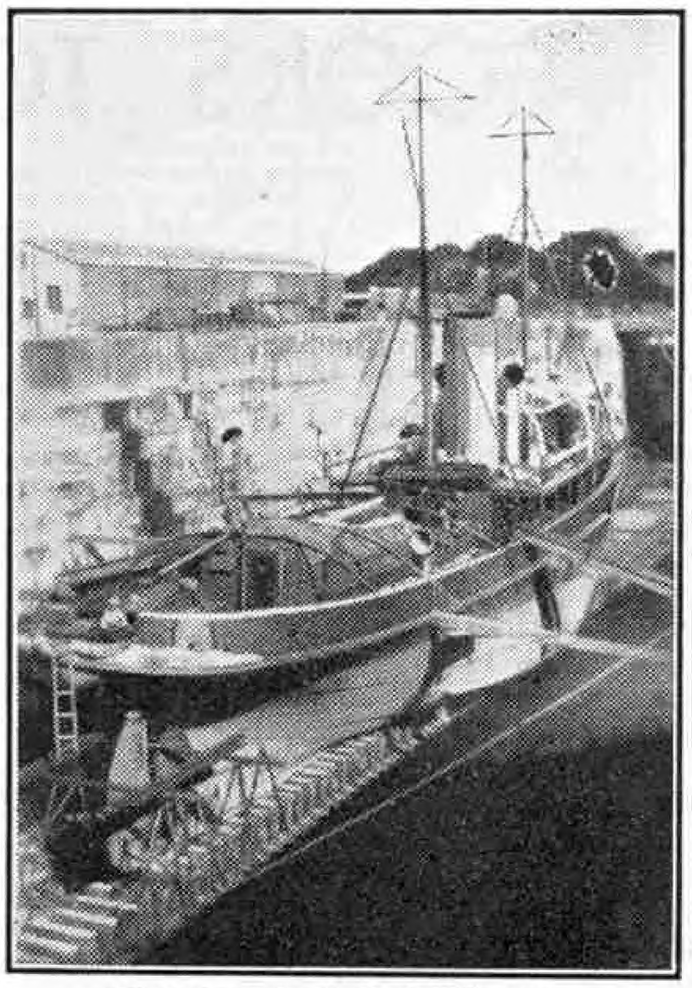
An interesting trick is that of Seaman Gunner of the Watch. It is his duty to see the signal guns cleared away and the ammunition placed in the position ordered for it in the rear of the gun, and to place a rocket ready for firing at sunset. He reports at sunset that this has been done.

We must not forget the leadsmen and sounding parties. Their duty is a very important one when entering or leaving harbour or when in shallow water of any kind. The former are placed in the chains and relieved every hour or more frequently if the weather is such as to make it necessary. The latter consist of two hands and a leading hand, and are told off on each watch as a sounding party. If their services are needed, they are piped to work the sounding machine. They are relieved as the occasion demands.

The safety of the men is also considered, and a sentry is placed on the lifebuoy when the ship is under weigh, and it is his duty to let it go if a man should fall overboard. At night a special lifebuoy is used that gives a flare the moment it touches the water, thus enabling the man in the water to locate it.

A carpenter of the watch is also told off to go round the ship every two hours to see that she is not making any water.

In this short article it has only been possible to deal very briefly and in a general way with a selection of the routine duties of the crew of a ship of war. There are of course many others, equally interesting, and all of them playing an important part in the everyday working of the vessel.



Minesweeper in dry dock at Capetown.

How Submarines are Hunted—

(*Continued from page 407*)

the battle-fleet, convoys and on submarine patrols.

The operator on watch carries on a continuous search until such time as a submarine is heard. He then reports "Submarine bearing . . . green 40 degrees."

The information is passed on to a consort in order to get two vessels on the target and ensure accuracy and continuous contact during a "hunt." Course is altered towards the U-boat, speed is increased and the depth-charge personnel warned. When the ship is over the submarine depth-charges are dropped to explode at various depths—one from the stern, one fired from a howitzer on either side of the ship and another from the stern. Round goes the hunter and if necessary another load of deadly explosive is dropped on the quarry.

The submarine is at a grave disadvantage for two reasons, firstly because she is "blind" and has no idea of what is happening, while, although her hunters cannot see her, they know exactly what she is doing and, secondly, because her submerged speed is low and the hunting craft can therefore make "rings round her." In fact it is true to say that Asdics have largely defeated the menace of the underwater assassin.

Its advantages were shown in a statement by the Prime Minister when First Lord of the Admiralty in comparing our present position with that of the Great War when he was also First Lord:

"There were moments when the problem seemed well-nigh insoluble. Very often to hunt down a U-boat it was necessary to use a flotilla of 15 to 20 vessels working for a whole day on vaguest indications. Now two destroyers, or even one, can maintain a prolonged and relentless pursuit . . . ."

The success of Asdics may be measured by the fact that four U-boats were destroyed in one day, two of them the largest and latest ocean-going vessels. On another day one destroyer, the "*Antelope*." was successful in sinking two that attempted to attack her convoy in one afternoon.

Mr. Churchill has stated that at a conservative estimate the average number of sinkings lay between two and four a week, according to the number at sea. It is believed that during the first eleven months of the war over 70 German U-boats have been destroyed—a greater number than that with which the Nazis began hostilities. Success has been no less against Italian submarines because, although Italy started with 115 vessels, some 16 were destroyed within seven weeks of her entry into the struggle.

In this connection it is interesting to note that in 1917 Germany had 138 U-boats, nearly twice the number of September 1939 (70), and in 1918 some 169 with additional Austrian submarines.

U-boat successes fluctuate according to conditions. For instance, during the evacuation of the French ports, when certain vessels had to be withdrawn from anti-submarine work, our losses increased. Since then, under the normal disposition of our ships, the number has been reduced. In some weeks losses have been nil. Out of 24,697 ships convoyed only 32 have been lost—one in 772.

While we have been sinking U-boats at twice the rate of the best period in 1917, our average losses of merchant vessels have been less than one quarter of that period.

The result of a year of submarine warfare has shown that the Nazis greatly overrated the use of these vessels under modern conditions, and conversely greatly underrated the likely success of anti-submarine measures. Our losses in merchant vessels have been more than made good both by new construction and the transfer to our use of ships of nations subjugated by Hitler. The Navy and our Merchant Navy are much stronger than they were a year ago. Hence the sacrifice of U-boats and their personnel has largely been in vain.

At the height of the unrestricted submarine campaign of the Great War in April 1917 one out of every four ships which left our shores never returned, and it seemed that the end of the war, with defeat for the Allies, could be calculated with arithmetical precision. Although we had command of the sea on the surface, we had not below it. In this war the Navy mastered the submarine menace from the start and the U-boat can never again obtain the upper hand.

BOOKS TO READ

Here we review books of interest and of use to readers of the "M.M." With the exception of those issued by the Scientific and Children's Book Clubs, which are available only to members, we can supply copies of these books to readers who cannot obtain them through the usual channels. Order from Book Dept., Meccano Limited, Binns Road, Liverpool 13, adding 1/- for postage to the price. Postage on different books varies, but any balance remaining will be refunded.

"The Way it Works."

By Professor H. M. Low. (Peter Davies. 8/6 net)

Professor Low has had the bright idea of telling us in brief how a large and interesting range of things work. These include ingenious gadgets familiar in everyday life. from the telephone and the automatic gramophone record changer to the locks that guard our doors, and devices of all kinds for use on land, at sea and in the air that make life easier or more dangerous or help us to extend our knowledge.

More than 80 things are explained in the book, and in a short review it is only possible to give some indication of their nature. We begin with a series of air devices, such as the slotted wing, the retractable undercarriage, the parachute and other items that are of topical interest. Then follow other warlike things such as the machine gun, the range-finder, the torpedo and the gas mask. The gas mask article is of special interest as a typical example of Professor Low's method. We all have gas masks, but how few know that when we wear them the air we breathe passes through a layer of activated charcoal and a cellulose filter, which between them are capable of removing harmful gases and the minute particles of solid matter that are the basis of certain so-called "gases." This information is given concisely but makes the purpose and use of the mask clear to the ordinary individual.

Other devices that are explained in a similar manner include the iron lung, television, the automatic telephone, traffic signals, the speaking clock, the vacuum cleaner, the Yale lock and the zip-fastener. The production of films in colour, aids for hearing, the canning of foods and the working of the gyro-compass are among other things explained, and altogether there is a wealth of information on a wide variety of topics that will just suit the enquiring reader.

There are 28 photographic illustrations and a frontispiece.

"Airfoil Sections for the Aeromodeller"

By J. W. B. Cruikshanks (Harborough Publishing Co. Ltd. 1/6 net)

This little book fulfils a long-felt want in the aeromodelling world by supplying in concise form data on airfoil sections that has not been available to the average model aircraft builder. Its purpose is to give him some idea of the use of various airfoil sections and their suitability for certain purposes. The explanatory chapters and the details and graphs will be helpful to all interested in the hobby, and the plotting of airfoil curvatures is dealt with so fully that even the beginner will have no difficulty in applying the principles to his own needs.

"The Flahertys of Aran"

By Agnes C. Lehman (Harrap. 5/- net)

The Flahertys live in a little whitewashed cottage on Inishmaan, one of the Aran islands off the west coast of Ireland. They are poor, for existence on the island is hard, but they have a splendid time in their own simple way, with many grand adventures.

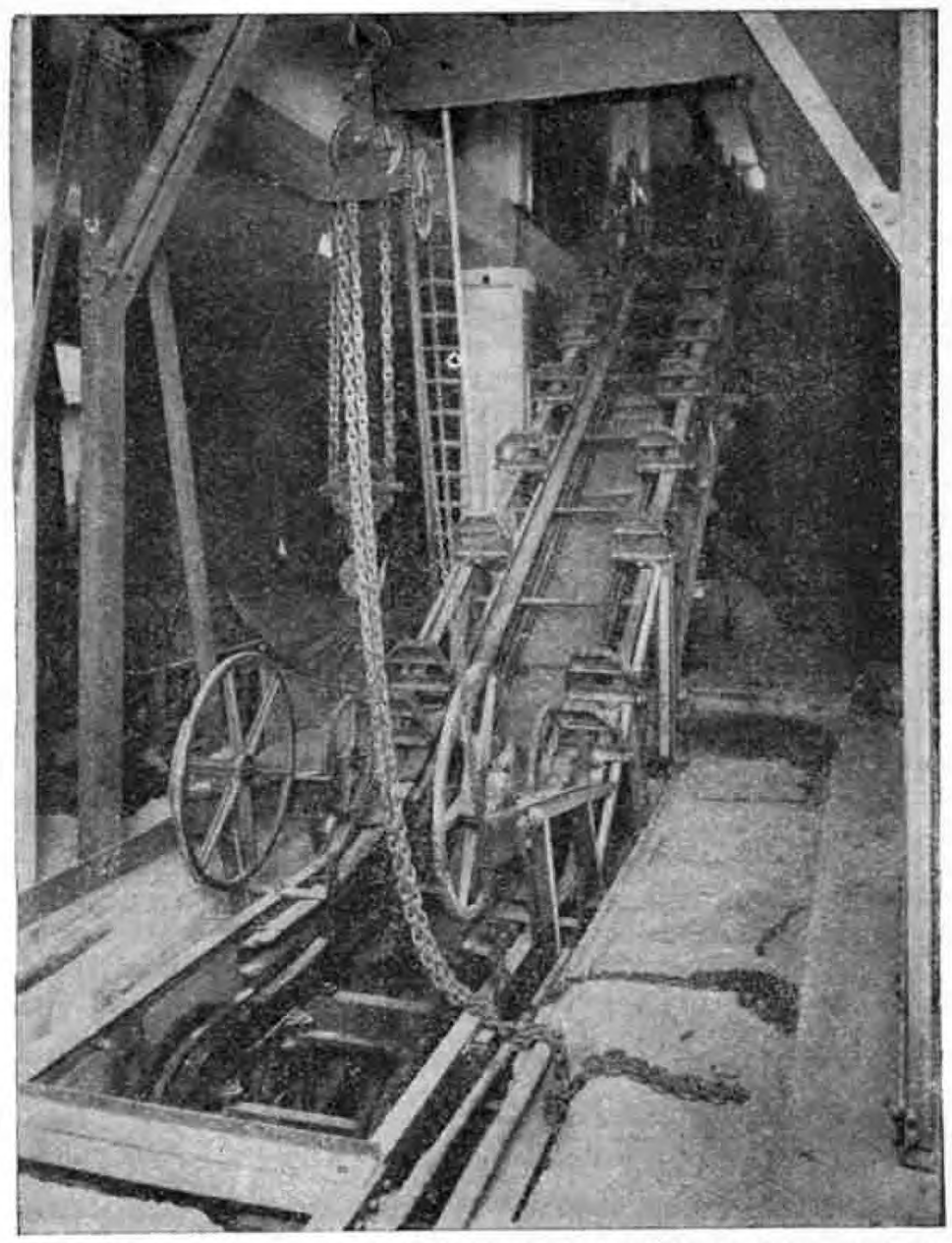
To begin with they cross to the mainland to see the cattle fair at Galway, and ride for the first time in their lives in a motor bus, the whole adventure being a little frightening. Back at home they gather seaweed for the garden, and keep the potato field and cabbage patches free from weeds. All the time Sheila and her brother Pat are searching for the crock of gold that will pay for the cure of their lame sister, and by a miracle, whether with the help of saints or of fairies, the crock is discovered. The story is full of the romance and legend of the Irish islands.

There are many interesting drawings that help readers to picture the scenes described.

"Scale Plans of Military Aircraft"

By C. A. H. Pollitt (Harborough Publishing Co. Ltd. 3/6 net)

This interesting book gives details of 39 military aircraft of current British, American, French and German types. It caters for both model aeroplane enthusiasts and for members of the Royal Air Force Observer Corps, Air Cadet Corps, and others interested in identifying full-size aircraft.

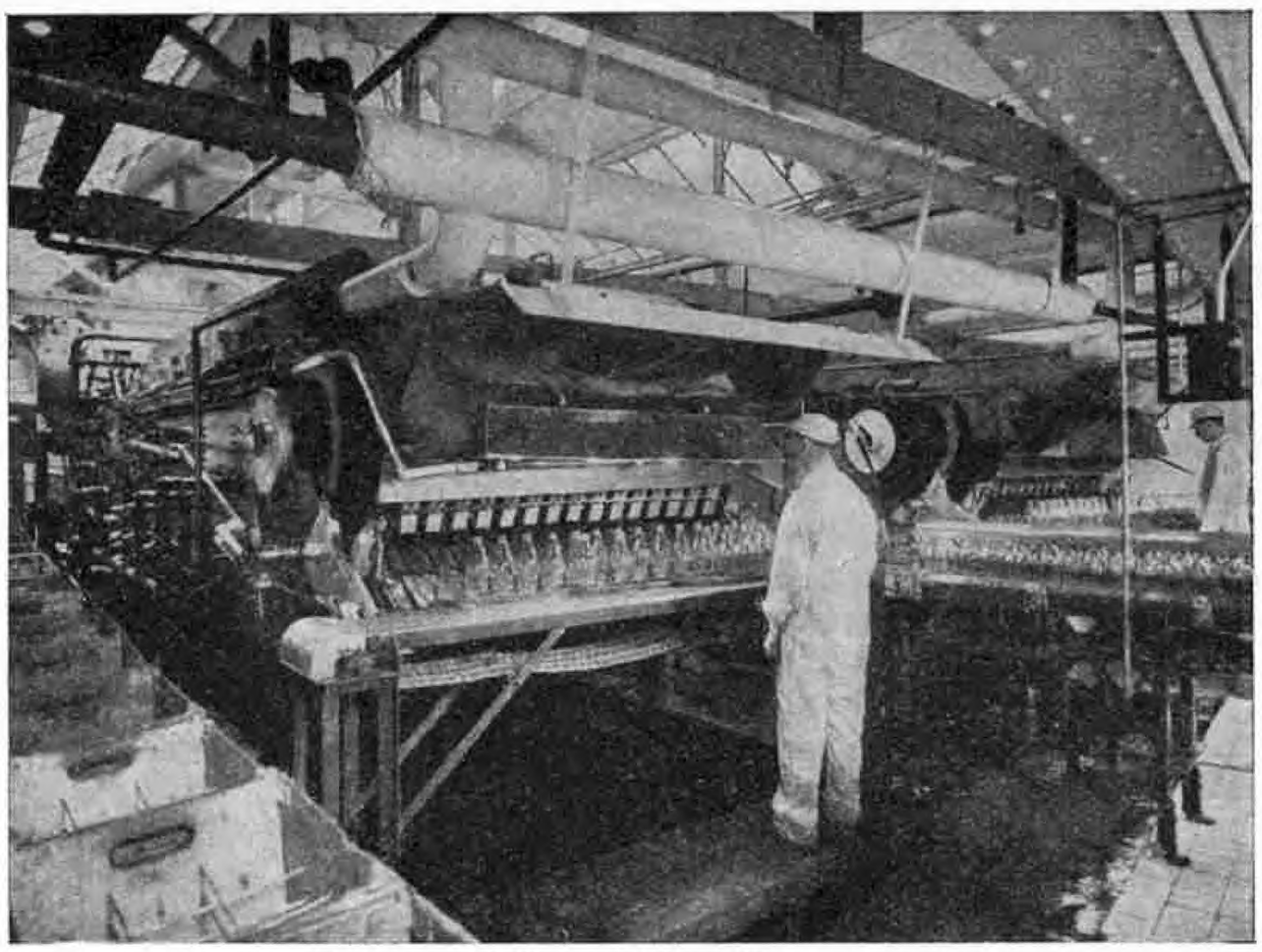


The mechanism of an escalator. This illustration and the one below are from "The Way It Works," reviewed on this page.

For the former there are large page or double-page scale drawings of each machine, and facing each page of plans is a half-tone illustration of the full-size machine concerned, with descriptive details for the guidance of the spotter.

The drawings include cross-sections of the wings and fuselage, and are to a scale of 1/72nd. full size. Every detail therefore cannot be given, but the main characteristics of the machines are well shown. The text accompanying the photographs gives details of performance where these are available for publication, with notes on the colouring and the Service markings of the machine.

The book fills a definite need, and its topical nature should ensure its success.



A bottle-washing machine.

"The Pool in the Glen"

By R. C. Killip (Children's Book Club. 2/6)

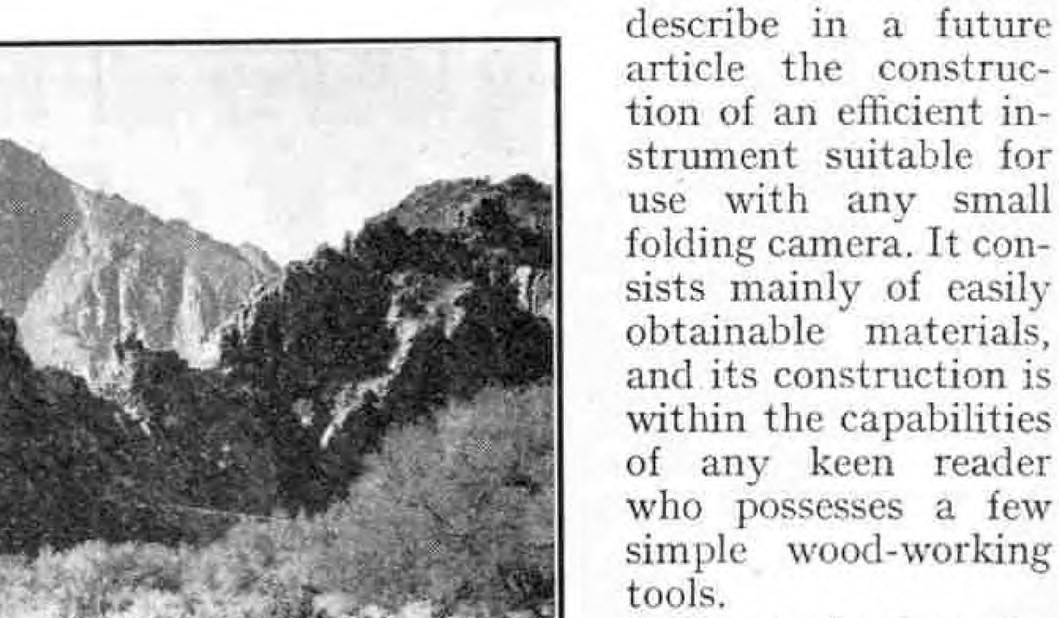
This fairy tale of the Isle of Man will delight our youngest readers. The pool in the glen is bottomless and down through its waters is the way to a happy fairyland. Malane is entranced by the music made by the fiddlers and pipers of the fairyland in the glen, and loses interest in the household drudgery thrust on her. In the meantime the farmer with whom she lives offends the fairy world and is bewitched, losing his cattle and finding milking and butter making go wrong. Everything works out in true fairy fashion, however. Malane finds peace and rest with the little folk of the pool, and the curse is lifted from the farmer.

PHOTOGRAPHY

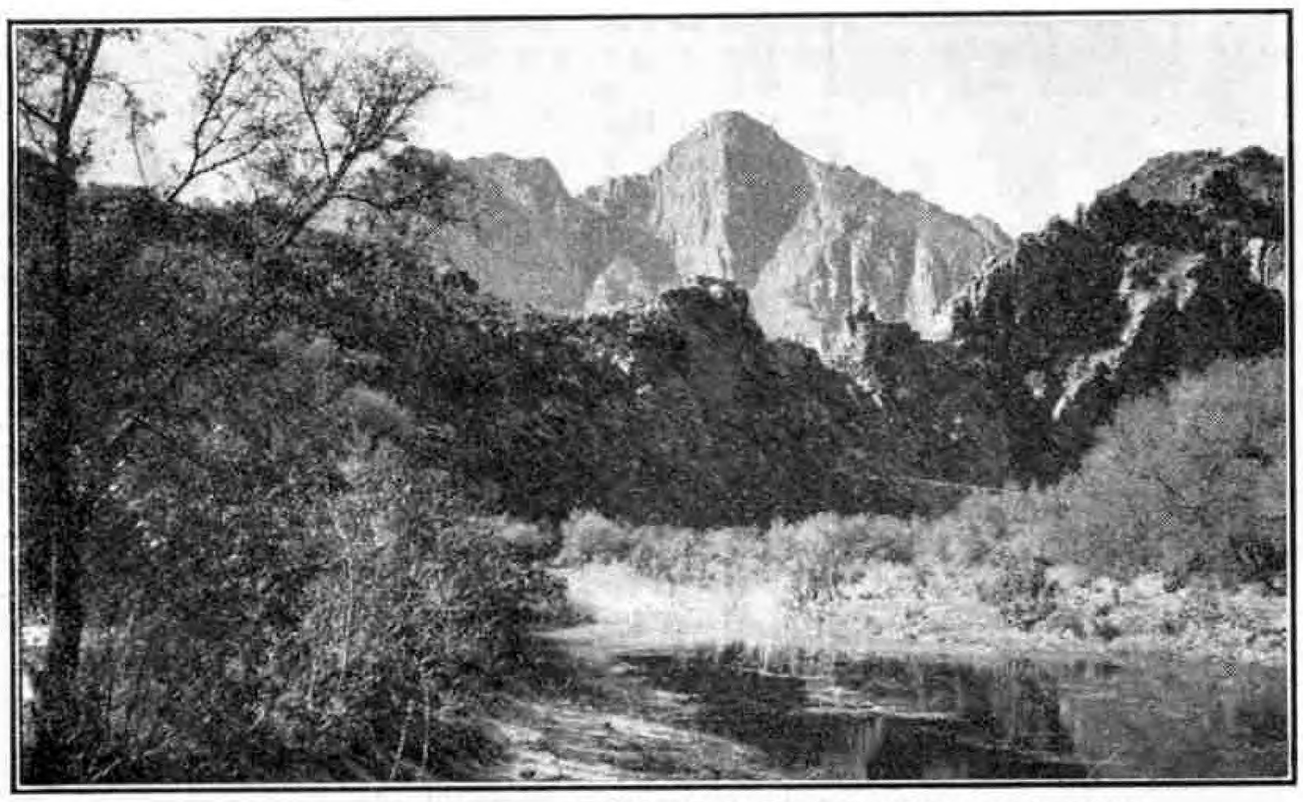
Planning for the Winter

THERE should be little need nowadays to emphasise the fact that amateur photography is no longer a hobby for the summer season only. Modern films, lenses and cameras have made good photography independent of sunny days, and have made it possible to take photographs indoors by means of artificial light. Most photographers therefore now use their cameras all the year round, and although the shorter days and more unsettled weather that we must now expect make picture hunting excursions less attractive than in the summer, good outdoor photographs are still obtainable.

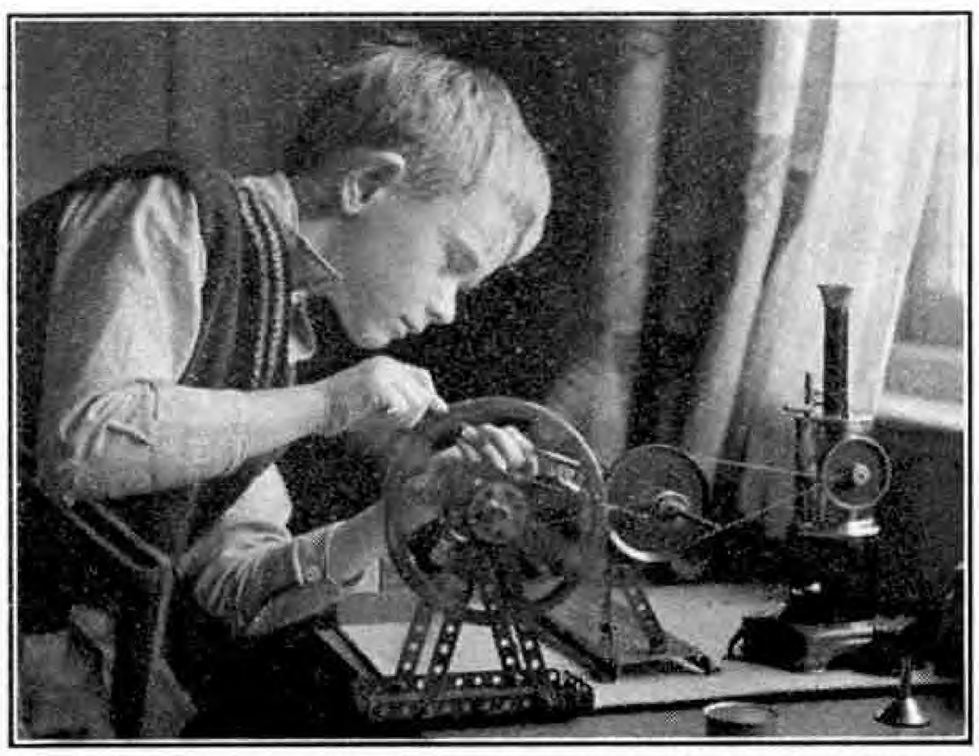
Sunlit autumn landscapes have a special attraction all their own, but it must be remembered that their beauty depends very largely on the prevailing rich red and brown tints. In order to reproduce the autumn effects with any success, it is necessary to use a panchromatic film and a colour filter. Judging from my correspondence some readers seem rather scared of such a procedure, but I can assure them that there is no special difficulty at all with panchromatic films. I strongly advise any reader who is still in doubt to consult his photographic dealer about a suitable film and filter, and then to experiment on a few landscape pictures. I am sure that he will be agreeably surprised at the results.



"A lively catch." An unusual snap by W. Barr, Birkenhead.



An interesting landscape photograph by P. C. Roux, Montagu, South Africa.



"Final Adjustments." This picture of a young engineer at work is by E. Richardson, West Bridgford, Nottingham.

Although there are still a few weeks before outdoor work will lose its attractions for most of us, it is a good plan to commence now with one's preparations for the winter season. As most holiday and other summer snapshots are made by means of a small camera the making of enlargements from them is almost a necessity if they are to be seen at their best. Some readers no doubt already possess an enlarger, and will be aware of the wonderfully increased interest that it brings to their hobby; but there are many who have not so far attempted this work. For the benefit of readers who do not possess an enlarger, and are unable to afford a professionally-made one, I intend to describe in a future article the construction of an efficient instrument suitable for use with any small folding camera. It consists mainly of easily obtainable materials, and its construction is within the capabilities of any keen reader who possesses a few simple wood-working tools.

Now is the time also to think about schemes for making gaslight prints of all our good negatives, and of some of the not-so-good ones. I shall deal with gaslight printing in a later article. There are few more interesting ways of spending an evening than in preparing prints for an album or for mounting to give to one's special friends.

The amount of interesting photographic work that can be done during the long dark evenings is almost endless, and in successive articles I shall deal with various topics, including the making of "trick" photographs, and that never-ending source of amusement—table-top photography.

I shall be glad to receive suggestions from readers in regard to subjects to be dealt with. I hope also that those who experience any of the mysterious failures that are liable to occur in photography, will send me details.

New Meccano Models

Destroyer—Reading Lamp—Crane

THE largest of the three models we are describing this month is the sturdy destroyer shown in Fig. 3. The other two are a reading lamp and a small travelling crane that can be built from the contents of Outfit No. 2.

The construction of the destroyer is commenced by building the amidships deck, which consists of two $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plates spaced $\frac{1}{2}''$ apart by $5\frac{1}{2}''$ Strips bolted to their flanges. These are extended to the stern by a Flanged Sector Plate joined to one of the $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Flanged Plates by $3\frac{1}{2}''$ Strips. The rounded stern is formed by two $4\frac{1}{2}''$ Strips bent to shape and held together by a Flat Bracket. Two further $4\frac{1}{2}''$ Strips are then bolted to the first pair, and two $12\frac{1}{2}''$ Strips are connected to two $7\frac{1}{2}''$ Strips that form the lower parts of the bows.

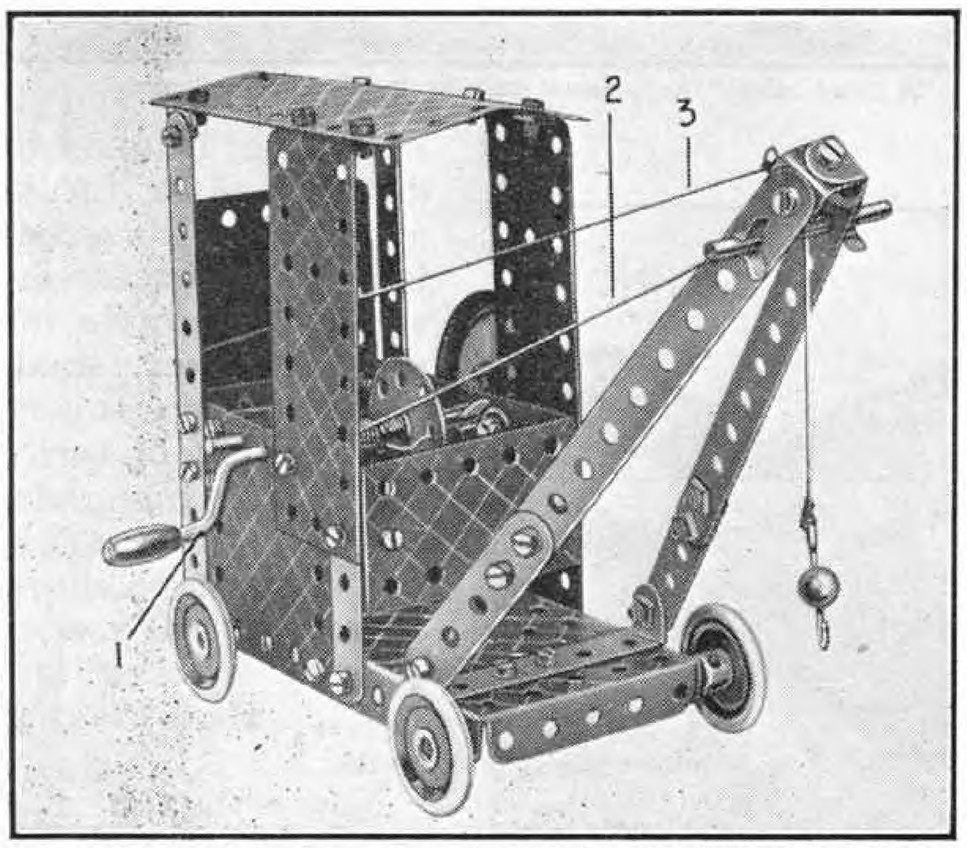


Fig. 1. This simple model crane can be built from the parts in Outfit No. 2.

The sides and front of the bridge are $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plates, and its deck is a $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plate. The chartroom is made up from four 2″ Strips and four $1\frac{1}{2}''$ Strips fixed together by Angle Brackets and Flat Brackets, and attached to the floor of the bridge by Angle Brackets. The roof is a $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plate, of which a length of 2″ is bent at right angles and the remaining $\frac{1}{2}''$ length is held to the back wall of the chartroom by bolts. Above the chartroom are two $2\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plates, each of which has $\frac{1}{2}''$ of its length bent at right angles. These are fixed in place so that their bent portions form the front of the structure.

The gun turret on the foredeck is composed of one $1\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip, which forms the front, and two $1'' \times 1''$ Angle Brackets that form the back. The rectangular structure so formed is roofed with three $2\frac{1}{2}''$ Strips bent up at the front to form the shield. The quick-firer mounted on the top of the turret is a $1\frac{1}{2}''$ Axle Rod fitted with a Collar that forms the gun breech. The Rod is pushed through a Handrail Support, which carries two Washers on its threaded shank above the turret.

Each of the two anti-aircraft guns at the rear of the bridge is a small Fork Piece, in which is mounted a $1\frac{1}{2}''$ Rod. The torpedo tubes consist of three Couplings held by Collars on $2\frac{1}{2}''$ Rods between 1″ Triangular Plates.

Parts required to build the model destroyer: 4 of No. 1; 4 of No. 1a; 2 of No. 1b; 4 of No. 2a; 2 of No. 3; 9 of No. 6; 1 of No. 6a; 30 of No. 10; 20 of No. 12; 1 of No. 13a; 1 of No. 14; 2 of No. 18b; 2 of No. 35; 115 of No. 37a; 105 of No. 37b; 11 of No. 38; 2 of No. 52; 2 of No. 54a; 29 of No. 59; 4 of No. 63; 1 of No. 63a; 3 of No. 1116a; 2 of No. 36; 1 of No. 138a; 6 of No. 188; 2 of No. 190; 2 of No. 217b.

The electric reading lamp shown in Fig. 2 is quite simple to build and the bulb can be supplied with current either from the $3\frac{1}{2}$ volt circuit of a Meccano Transformer or from a pocket lamp battery. It is constructed by fitting a $4\frac{1}{2}''$ Axle Rod with an End Bearing 1, an Anchoring Spring and a Double Arm Crank as shown. The Rod is then secured in the boss of the 3″ Pulley that forms the base. A second End Bearing 2 is pivoted to the first by a $\frac{3}{8}''$ Bolt, and carries a 2″ Rod at the end of which a Swivel Bearing 3 is fixed. A Wheel Disc is next secured as follows. The 6 BA Bolt of a Lampholder is slipped through the Wheel Disc and then a Flat Bracket 4 slightly curved, together with an Insulating Bush, is placed on the Bolt. The Bolt is pushed through the collar portion of the Swivel Bearing, a nut securing the parts in place. The Flat Bracket 4 is connected by wire to an Insulated Terminal mounted on one end of the Double Arm Crank. The second Terminal is in metallic contact with the crank.

Parts required to build the reading lamp: 1 of No. 10; 1 of No. 15a; 1 of No. 17; 1 of No. 19b; 5 of No. 37a; 2 of No. 37b; 1 of No. 62b; 1 of No. 165; 2 of No. 166; 1 of No. 175; 2 of No. 182; 1 of No. 182a; 1 of No. 183; 1 of No. 184b; 1 of No. 219; 1 of No. 1568 (Elektron Part).

The simple travelling crane shown in Fig. 1 is a good subject for owners of Outfit No. 2. Each side of the jib consists of a $5\frac{1}{2}''$ Strip and a $2\frac{1}{2}''$ Strip, which are

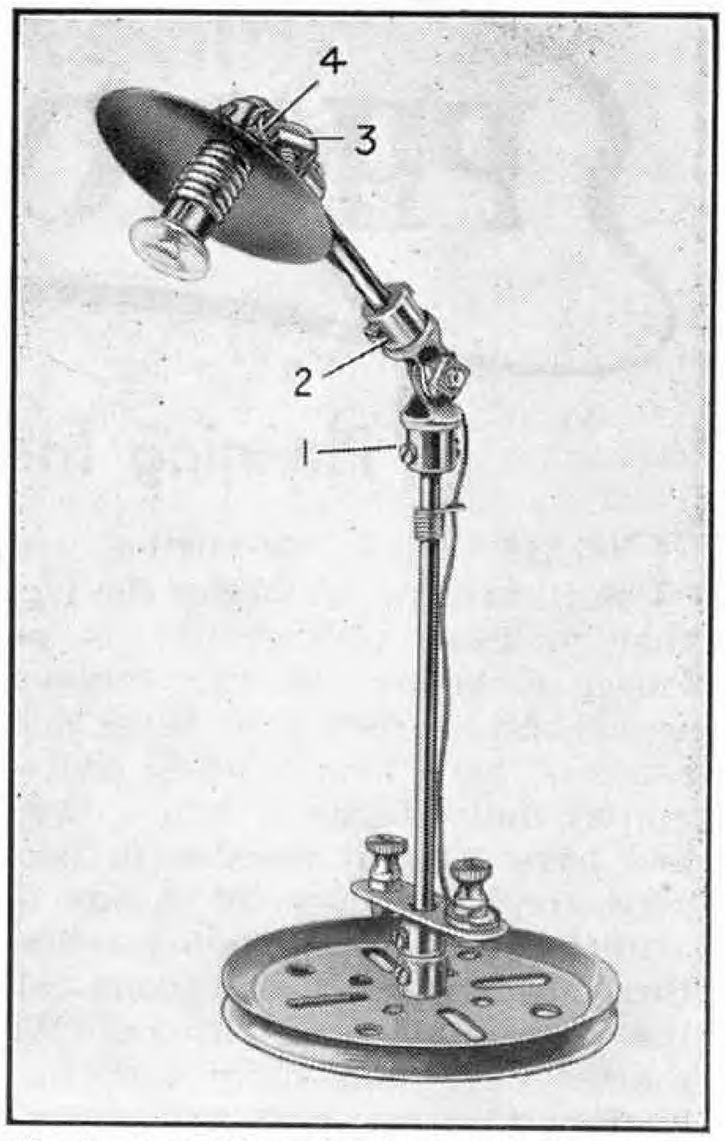


Fig. 2. A useful reading lamp made from a few Meccano parts.

connected by Bolts to form 7″ Strips. The sides are joined together by Angle Brackets, and at their inner ends are pivoted to the ends of a $2\frac{1}{2}'' \times \frac{1}{2}''$ Double Angle Strip that is fastened by $\frac{3}{8}''$ Bolts to a $5\frac{1}{2}'' \times 2\frac{1}{2}''$ Perforated Flanged Plate.

The cab frame is formed from two $5\frac{1}{2}''$ Strips. These support one end of the roof the other end of which is supported by two $5\frac{1}{2}'' \times 1\frac{1}{2}''$ Flexible Plates. Two $2\frac{1}{2}'' \times 2\frac{1}{2}''$ Flexible Plates form the sides of the cab.

The Crank Handle 1 carries a Bush Wheel, a Road Wheel and a Cord Anchoring Spring to which the hoisting Cord 2 is tied. It is braked by means of a $2\frac{1}{2}''$ Axle Rod passed through a Reversed Angle Bracket, and is prevented from overrunning by means of a Spring Clip. The jib is held at the required angle by Cord 3, which is tied to the back of the cab. The crane travels on 1″ Pulley Wheels fitted with Rubber Rings.

Parts required to build the travelling crane: 2 of No. 2; 4 of No. 5; 3 of No. 10; 4 of No. 12; 1 of No. 16a; 1 of No. 19g; 1 of No. 21; 4 of No. 22; 4 of No. 35; 40 of No. 37; 1 of No. 48a; 1 of No. 52; 1 of No. 125; 4 of No. 155a; 1 of No. 176; 1 of No. 188; 2 of No. 189; 4 of No. 190.

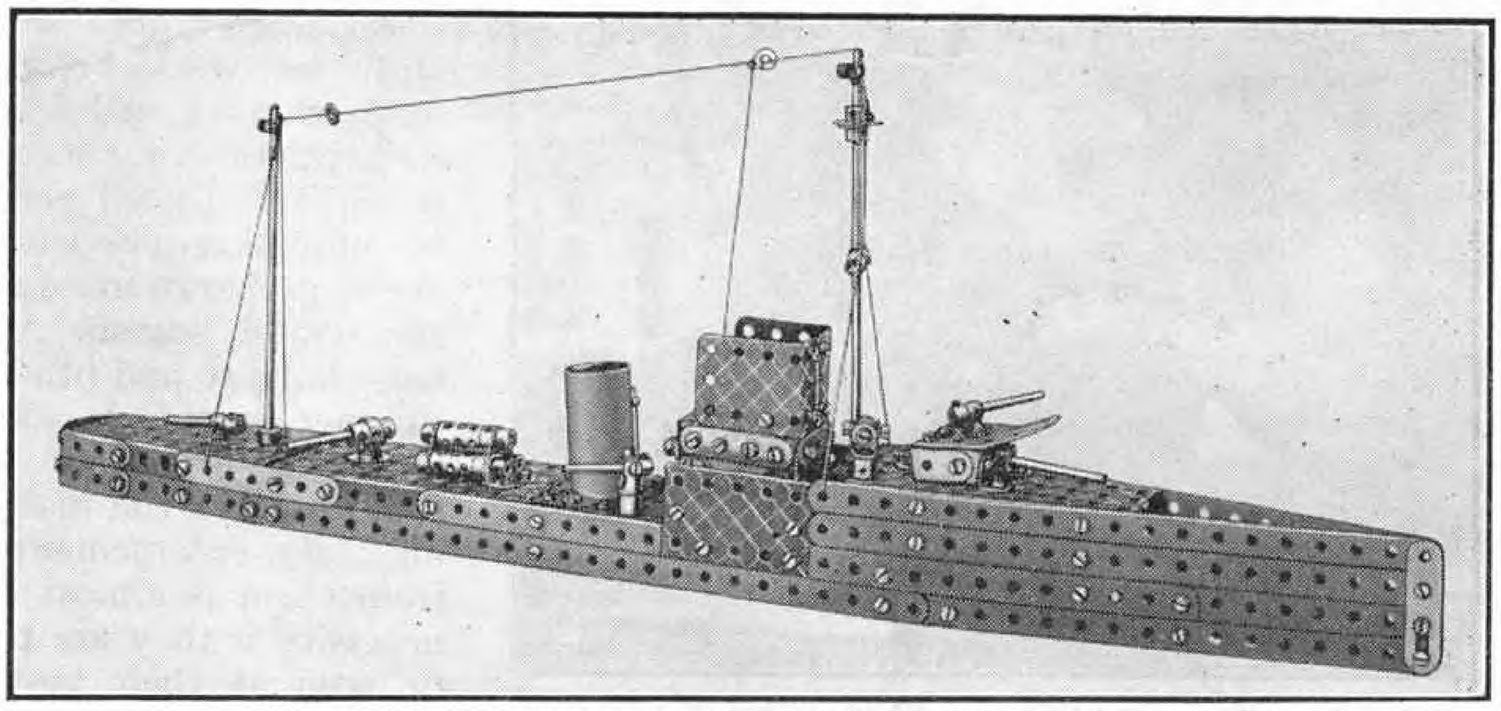


Fig. 3. A model destroyer built mainly from Flexible Plates.

Model-Building Competitions

"September" General Model-Building Contest

IN this competition we are offering fine prizes for models of any kind whatever built from Meccano parts. All a competitor has to do is to think of an interesting subject that he can build from the Meccano parts he possesses, and then to set to work to reproduce it as neatly and realistically as possible. He may use any number of parts, but all the constructional work must be his own handiwork.

All readers of the *"M.M."* are eligible and their entries will be grouped into two sections, one of which will be for competitors over 15 years of age, while the other will be for those from competitors aged 15 and under.

When the model is completed a photograph or a good drawing of it should be sent to *"September General Model-building Contest,"* Meccano Ltd., Binns Road, Liverpool 13. More than one model may be submitted, but no competitor may win more than one prize. If two or more models are sent by one competitor they will be considered jointly. The competitor's age, name and address, and the name of the competition must be written on the back of each photograph or drawing submitted. If the age of the sender is omitted the entry will be disqualified.

Prizes will be awarded for the best models received in each Section. In making their awards the judges will be guided by the interest and originality of a model and they will look also for such important features as sturdy construction and neat workmanship. A small well-built model therefore will have just as much chance of success as larger structures.

The prizes to be awarded in each Section are as follows. First, Meccano products value £3/3/–; Second, products value £2/2/–; Third, products value £1/1/–. There will be also five prizes of products value 10/6 and several consolation awards.

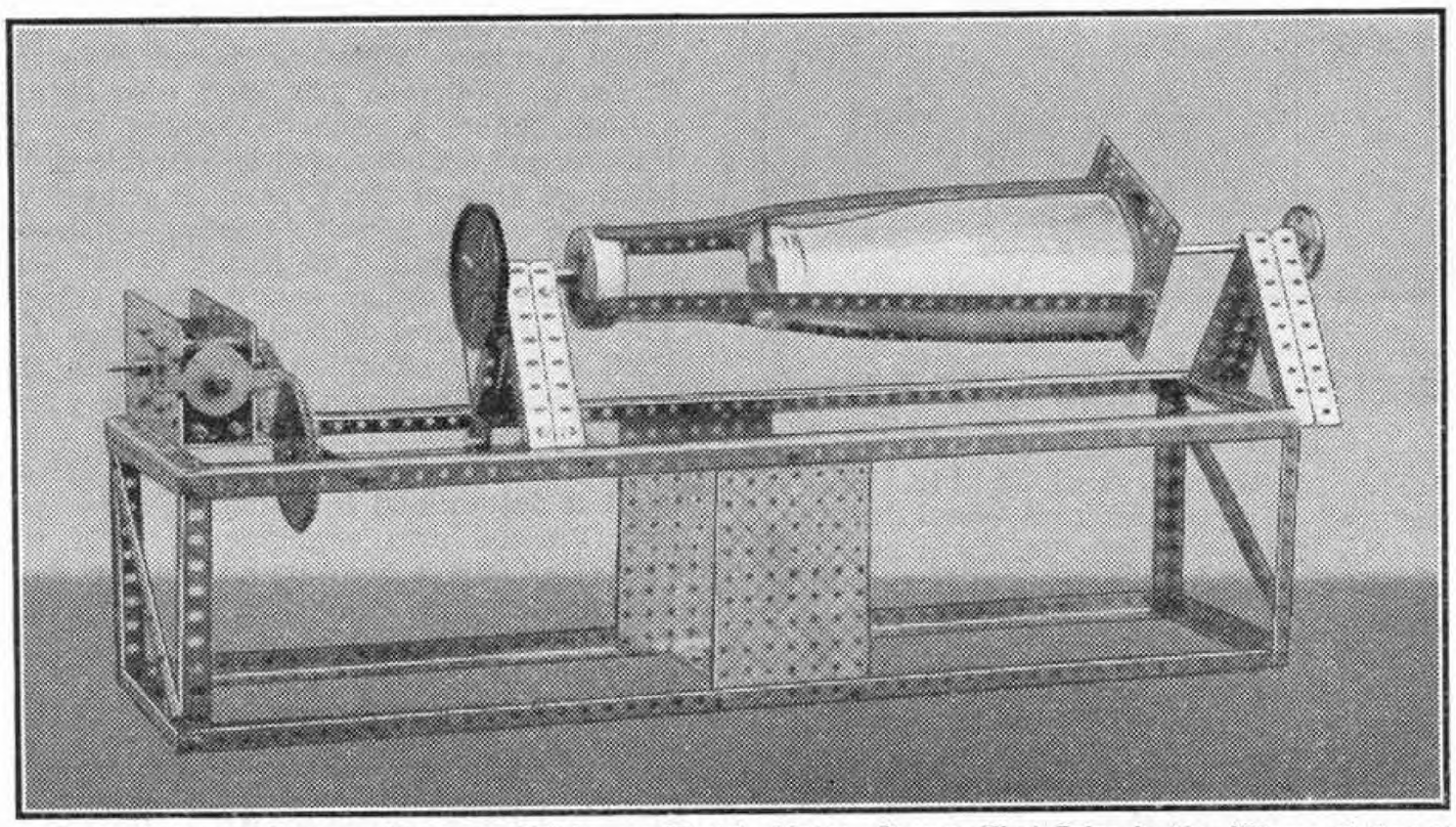
Entries must be posted in time to reach Liverpool before 31st October. Entries received after that date will not be considered. Photographs or drawings of models awarded prizes will not be returned to competitors, and unsuccessful entries will be returned only when a correctly stamped and addressed envelope is sent for that purpose.

Prize-Winners in the "Home Gadgets" Contest

In this competition, which was announced in the March issue of the *"M.M."*, prizes were offered for Meccano gadgets of any kind that could be put into practical use in the home. Readers who were successful in winning the prizes are as follows:

1st Prize, Cheque for £3/3/–: P. M. Davies, London S.W.6. 2nd, Meccano or Hornby goods value £2/2/–: J. Mathews, Aylesbeare Common. 3rd, goods value £1/1/–: W. Houghton, Daventry.

Meccano or Hornby products value 10/6: B. Gillyatt, Chesterfield; R. Ranson, Littleover; F. Rowland, Hazel Grove; F. Higgins, Stourbridge; L. Masters, Bletchley.



A simple butter-making machine operated by an Electric Motor. It won First Prize in the "Home Gadgets" Contest for P. M. Davies, London.

Meccano or Hornby products value 5/–: T. Wade, Johannesburg; W. Raybould, Bloxwich; D. Ferraro, Little Chalfont; F. Clapcott, Edgware; G. Swain, Waikato, New Zealand.

The First Prize was awarded for the butter-making machine illustrated on this page, which owes its success mainly to its novelty and its simple construction. The constructional details do not need description, and as can be seen from the illustration it is operated by a Meccano Electric Motor.

A model of a very different type, but one that is equally useful in the home, was sent by J. Mathews, Aylesbeare Common. He designed an indoor clothes line made entirely from Meccano parts and strong enough to support a well filled line of clothes. I intend to illustrate this model in *"Suggestions Section"* in due course.

Several competitors submitted models of various types of household scales, and among these was W. E. Houghton, whose model is capable of weighing loads up to 6 lb. It is provided with an adjustable Screwed Rod that enables the pointer to be kept in accurate registration, and the balance pan when pressed downward by a load operates a spring mechanism that actuates the pointer. The model is quite simple, and the few parts of which it is built are skilfully arranged so that sturdy construction is obtained.

Another interesting model is an egg whisk, designed to clamp on the rim of a basin. This was sent by B. Gillyatt, Chesterfield, and is operated by turning a handle, on the shaft of which is a Contrate that engages a ½" Pinion. On the shaft carrying the latter is a ¾" Contrate that in turn meshes with a further ½" Pinion mounted on a Rod carrying at its lower end a Meccano Fan. The mechanism is suitably supported in a framework of Double Angle Strips, and means are provided for clamping the machine to basins of various diameters.

R. Ranson, Littleover, seems to be a keen gardener, for the model he submitted is a self-cleaning device that can be fitted to any ordinary garden rake. It consists of a 12½" Angle Girder, each end of which is attached by means of a 2½" Double Angle Strip to two 12½" Strips. The other ends of the Strips are joined together and attached to the handle of the rake by means of a clip formed from a 5½" Strip. The Angle Girder then rests in front of the teeth of the rake. To remove leaves or rubbish from the rake it is only necessary to turn the rake on its back and apply a slight pressure. The Angle Girder is then forced across the ends of the teeth, thus effectively removing the clogging materials.

Among the many other ingenious models submitted were gas lighters, wool winding machines, automatic door stops, egg slicers, book racks and reading stands, and a rather complicated arrangement designed for extinguishing a gas jet at a given time. The extinguisher was designed by J. H. Smith, Teddington, and is intended for use in boiling eggs for a given period. It is ingenious but unfortunately is rather complicated, and for this reason it is not very practical.

One of the gas lighters submitted was sent by L. Masters, Bletchley. It is of the type in which sparks are produced by a flint caused to move across a strip of abrasive material such as emery cloth or a small piece of file.

A potato chip making machine was sent by K. Pargeter, Stourbridge. This consists of a circle of Curved Strips fitted with cutters formed by Rods and wires arranged across the circle at right angles. The potato is forced through the cutters by a 3" Pulley attached to a lever. The model is a novelty, but I am afraid the cutting arrangement is not satisfactory.

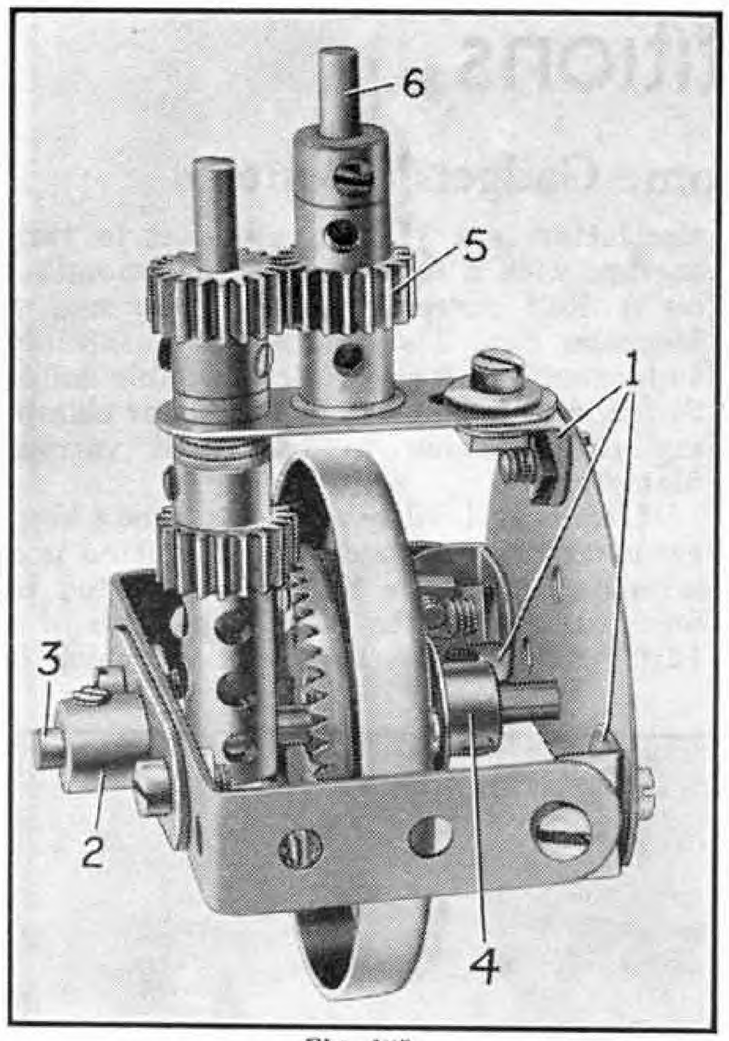


Fig. 480.

(480) Pivoted Front Wheel Drive

(K. H. Pritchard, Brook's Green)

The mechanism seen in Fig. 480 is designed as a pivoted front wheel drive for use in three-wheeled vehicles, such as mobile cranes and mechanical horses. It is suggested by K. H. Pritchard, Brook's Green.

The device is constructed by bolting three Angle Brackets 1 to a 2½" Semi-Circular Plate. To two of these Angle Brackets are bolted 2½" × 1½" Double Angle Strips, and the other ends of these are joined by a Double Arm Crank 2. A 2½" Rod 3, passed through the Double Arm Crank and the Semi-Circular Plate, carries a Wheel Flange to which a 1½" Contrate Wheel is bolted by four ⅜" Bolts. Four Washers on each Bolt space the Contrate Wheel from the Wheel Flange, both of which are free on the Rod. The Rod 3 also carries a Coupling and is held rigidly in place by tightening the Grub Screw in the Double Arm Crank. A ½" fast Pulley 4 which is held to the Rod 3 by its Grub Screw spaces the Contrate Wheel and Wheel Flange from the 2½" Semi-Circular Plate.

The Coupling provides a bearing for one end of a 2" Rod, the other end of which is journalled in one hole of a Double Arm Crank attached to the Semi-Circular Plate by the third Angle Bracket. The 2" Rod carries a ½" Pinion that meshes with the 1½" Contrate Wheel, the Pinion being spaced from the Crank by three Washers. A second ½" Pinion is carried on this Rod above the Double Arm Crank, and is also spaced from it by Washers. This Pinion meshes with a third ½" Pinion 5 which is carried on a 1½" Rod 6. The Pinion is loose on the Rod, which is fixed in the boss of the Double Arm Crank by its Grub Screw.

(481) Right Angle Drive Reversing Gear

(T. A. Wade, Johannesburg)

The frame of this Reversing Gear consists of two 5½" and two 3" Angle Girders bolted together to form a rectangle. Two further 3" Angle Girders are bolted across the frame 2" from each end. Bearings for the shafts 1 and 2 consist of a Trunnion bolted to the right hand 3" Girder, a Flat Trunnion held to the left-hand girder by ½" Bolts, with a Collar on each Bolt to act as a spacer, and a 1½" Angle Girder held to one of the 3" Girders by a 1½" Angle Girder. A 1" Corner Bracket is bolted to the Flat Girder. A Double Bent Strip is bolted to the back of the other 3" Angle Girder to provide a bearing for a 1½" Rod that carries a Collar at one end and a 1½" Contrate Wheel 4 at the other. This Rod represents the driven shaft.

The Contrate Wheel is spaced from the Girder by Washers. The Rod also carries a Bush Wheel, a Socket Coupling, two ½" Pinions and a Collar, and is slideable in its bearings. One of the Pinions is gripped in the boss of the Socket Coupling as shown in the illustration. The Rod 2 is 1½" long and carries a Collar and a Bush Wheel. The Bush Wheel is fitted with two 1½" Rods 5 and 6 which fit into holes in the other Bush Wheel so that the shafts 1 and 2 turn together.

The direction of rotation of the driven shaft is determined by bringing one of the two Pinions into engagement with the Contrate. This is done by sliding the shaft 1 to right or left, as desired, by means of a slideable 3½" Rod 5. This Rod carries a Coupling, in one end of which is a 1" Rod that engages the groove of the Socket Coupling.

Suggestions Section

By "Spanner"

(482) Three Speed and Reverse Gear-Box

(G. T. Parkyn, Barnet)

G. T. Parkyn, Barnet, has provided me with details of a compact three-speed and reverse gear-box that he designed with the object of reproducing as closely as possible the constructional method of operation of the gear-boxes usually fitted to small cars. An illustration of the gear-box is shown in Fig. 482 on the opposite page.

The frame in which the gears are housed consists of two 3½" and two 1½" Angle Girders bolted together to form a rectangle with their slotted holes horizontal. The space in the middle is filled in with a 3½" Strip. The sides are 3" × 1½" Flat Plates bolted to the 3½" Angle Girders. To each Flat Plate is bolted a 1½" Corner Bracket that supports a 1½" Angle Girder that is held to the Corner Brackets by Angle Brackets. The ends of the frame are 1½" Flat Girders, which form bearings for the various shafts. Two 1" × 1" Angle Brackets are bolted to the 3½" Strip, so that the projecting lugs are 1½" apart, and so that each lug is 1" from the end of the 3½" Strip.

The driving Rod 1 is a 3½" Rod and it carries a Collar, two Washers, a 1" Triangular Plate, a ¾" Pinion 2 as shown. It is passed through one of the 1" × 1" Angle Brackets and carries on the other side of the Bracket a ½" Pinion 3, two Washers, and another 1" Triangular Plate. The Rod projects nearly ⅜" beyond the 1" Triangular Plate. The driven Rod 14 is 2½" long and carries a Collar and a ¾" Pinion 5. It passes through the other 1" × 1" Angle Bracket and there is a ½" Pinion 4 on the portion on the other side of the Bracket. The Rod projects about ¼" into the bore of the Pinion 4. The projecting end of the driving rod fits into the other half of the bore of the Pinion. The right-hand layshaft 11 is 5" long and passes through the other hole in the 1" Triangular Plate and carries a ½" Pinion 13. Then it passes through a hole in the other Triangular Plate and carries on the other side of it a Pinion 10 taken from a No. 2 Clockwork Motor, and a ½" fast Pulley.

The left-hand layshaft 12 is a 5" Rod and carries a No. 2 Clockwork Motor Pinion 7, a ½" Pinion 6 and a ½" fast Pulley.

The reversing layshaft is a 2" Rod and carries two ½" Pinions 8 and 9 and a Collar and is journalled in the remaining holes of the 1" Triangular Plates.

The gear changing lever is a 3½" Rod that carries at one end an End Bearing, the arms of which fit into the grooves of the ½" Pulley.

The gear-change lever is universally mounted in a Swivel Bearing which is held by a Pivot Bolt that passes through a Collar fixed to the rear end of the gear-box frame.

The layshafts are retained in the neutral position by Pendulum Connections, which are bent to engage the grooves of the ½" Pulleys.

The various gear trains are as follows. The lowest gear is brought into operation by moving the control lever so that Pinion 3

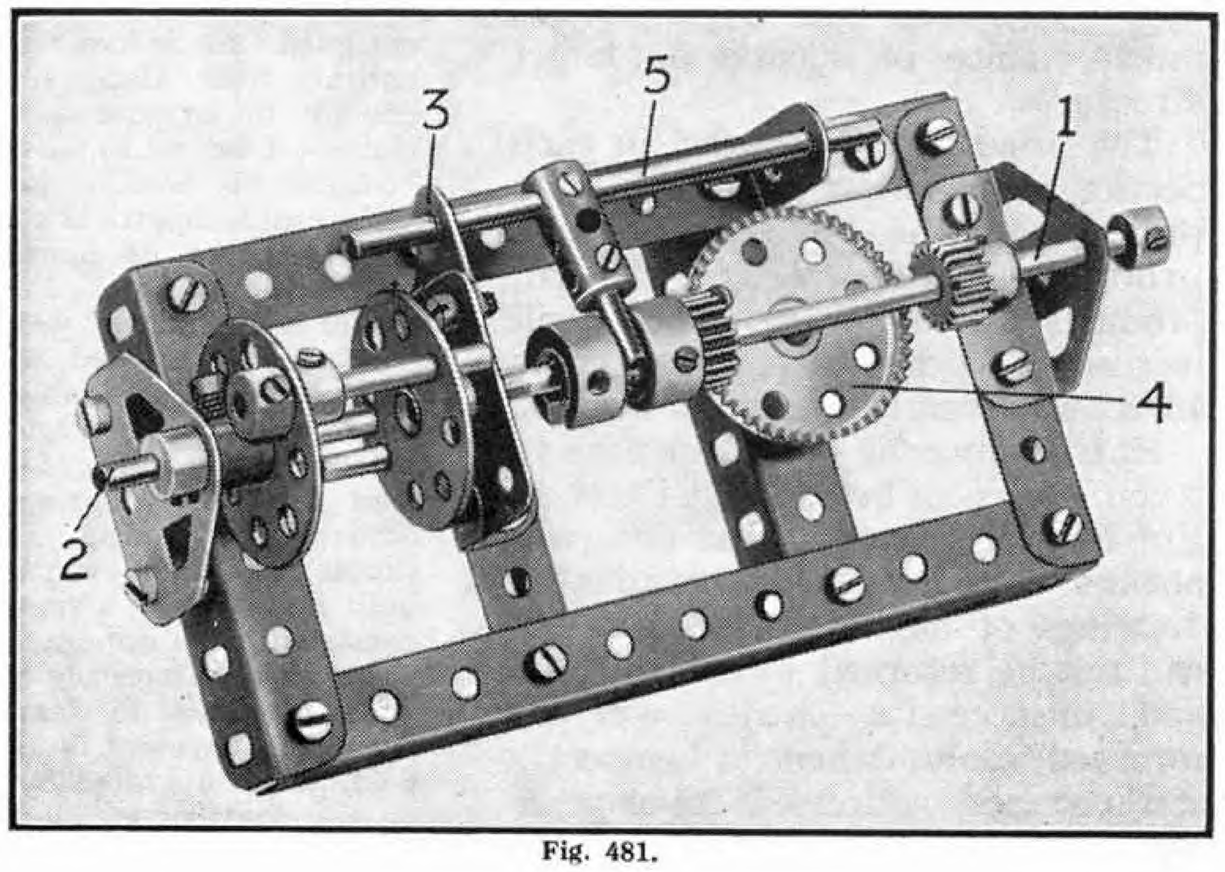


Fig. 481.

engages the Pinion 13 on the Shaft 11 and Pinion 10 engages Pinion 5. For second gear the lever is moved to the left and backward. This movement brings into mesh the Pinions 6, 4 and 3, giving a gear ratio of 1 : 1. The highest gear is brought into operation by moving the lever to the left and forward. This brings into mesh Pinions 2 and 7 and Pinions 6 and 4, giving a gear ratio of 3 : 1. Reverse drive is provided by Pinions 3, 9, 8, 13, 10 and 5.

(483) Steering Gear for Creeper Tracks

("Spanner")

Tanks, tractors, and other forms of transport in which creeper track is employed are often steered by employing separate power units to drive the tracks and varying the speeds of these units. This is not always practicable, however, and this mechanism is a Meccano model of another device.

The power is transmitted from the

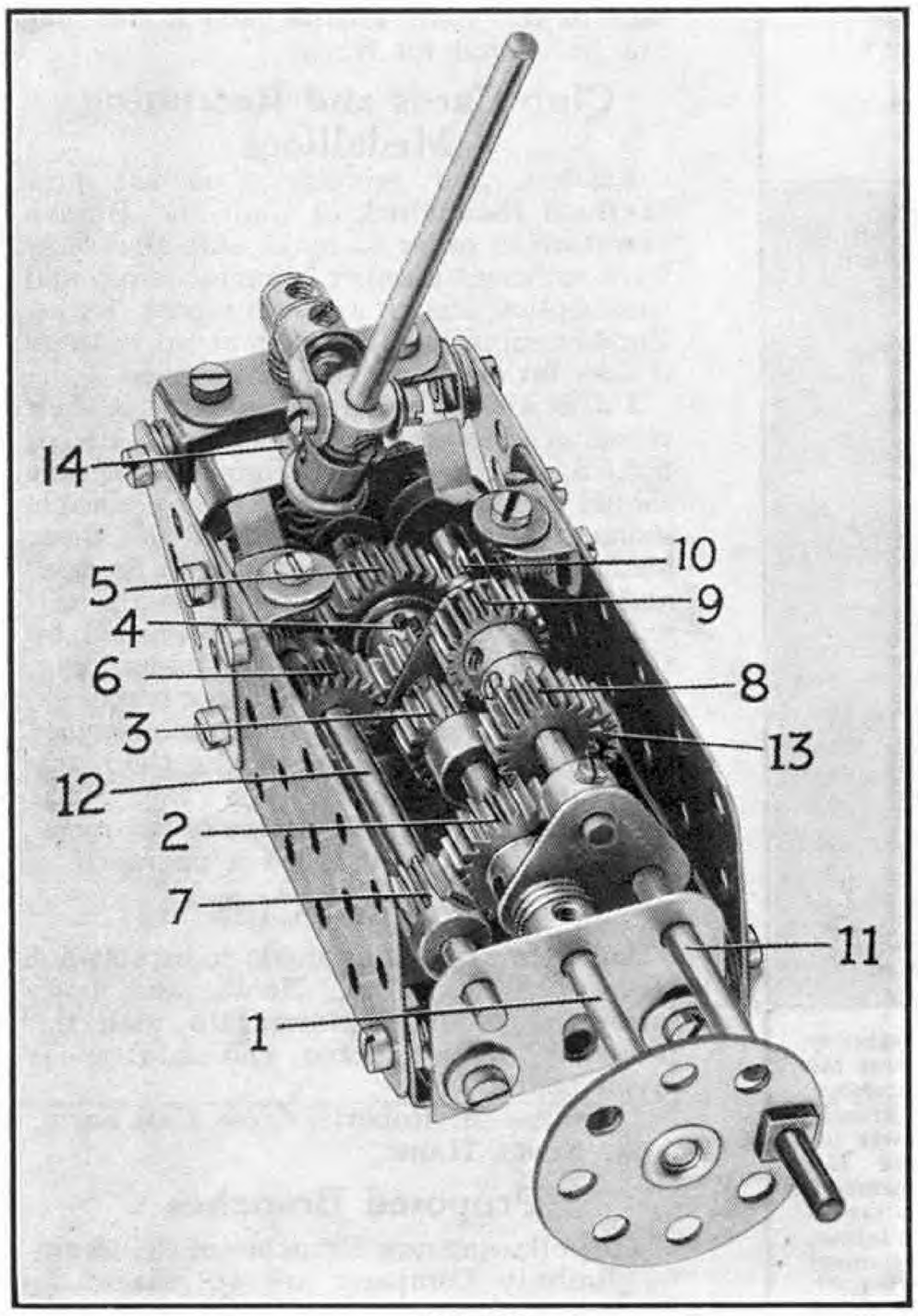


Fig. 482.

Motor by a single length of Sprocket Chain that drives a 1″ Sprocket Wheel 42 (Fig. 483) secured on a lay shaft, as shown in the illustration. This shaft is journalled in a suitable framework and is moved from side to side by means of a Crank 46. A Bolt in the end of this Crank is accommodated between two Collars 44 on the lay shaft, and the boss of the Crank is secured on a long Rod running the entire length of the tank or vehicle in which this mechanism is fitted. This Rod is fitted with a handle at the point from which the model is controlled.

A ½″ Pinion 45 is secured on each end of the lay shaft and these Pinions may be engaged or disengaged at will with two 1½″ Gears that drive through 2″ Sprocket 49.

If both sets of gears are in mesh, the vehicle proceeds on a straight course, because the creeper tracks are in line with the frame of the vehicle. The tracks can be rotated independently at will by sliding ½″ Pinions in and out of mesh with their respective Gears.

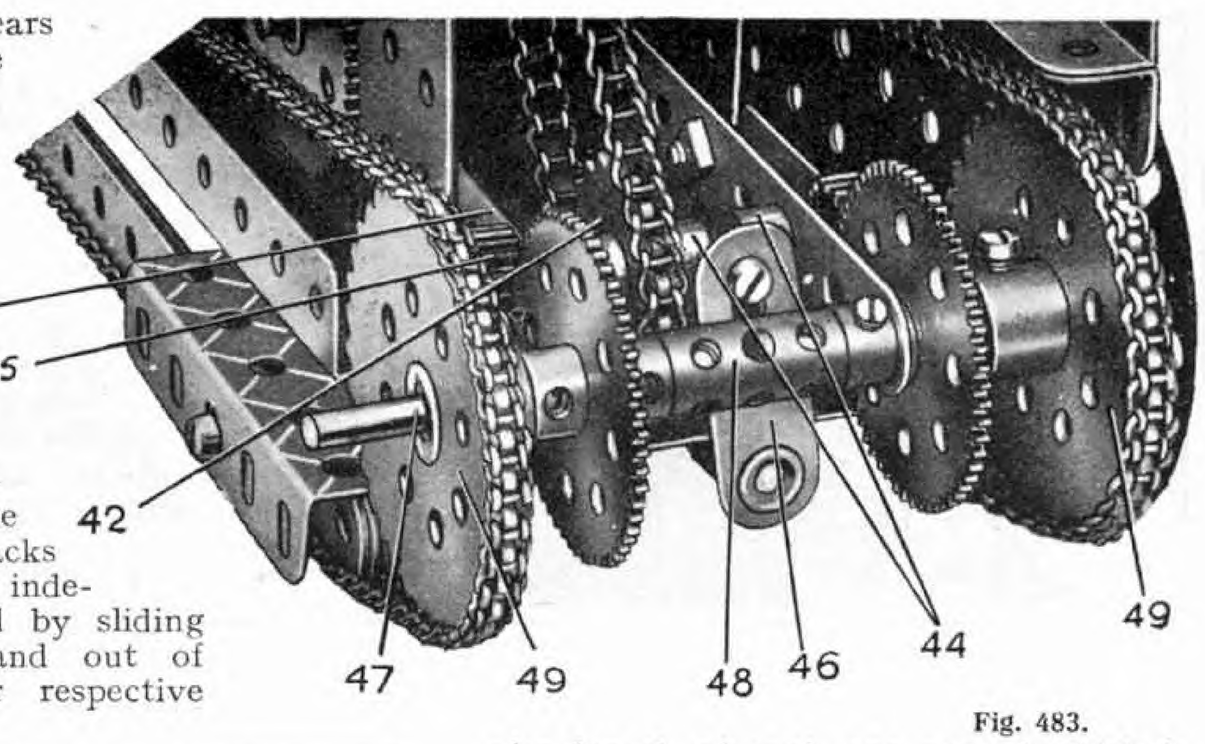


Fig. 483.

(484) Epicyclic Gear Clutch

(C. Potter, Streatham, S.W.16)

An efficient clutch movement that permits the driving power to be applied gradually makes an interesting and necessary addition to a large number of Meccano models such as roundabouts, traction engines and other structures in which heavy loads have to be taken up. The majority of the mechanisms of this type depend for their action upon the friction created between two revolving surfaces, one of which may be pressed against the other with varying force. On the other hand there is another form of clutch that employs spur gearing with which to obtain the required results. This is known as an epicyclic or gear clutch, and an efficient version of it can be constructed from Meccano parts, as shown in Fig. 484.

Two Rods are mounted in line with one another in any suitable bearings. One of the Rods serves as the driving shaft and the other as the driven shaft. The former is gripped by the set screw of a 1½″ Contrate Wheel, the teeth of which engage with ½″ Pinions 4 mounted on 1″ Axle Rods secured in the ends of a Coupling 5. The Pinions are free on their axles, but they are held in place by the Collars 6.

The Rod forming the driven shaft passes through the bosses of a 1½″ Pulley Wheel and a second 1½″ Contrate Wheel 8, and its inner end is secured in the centre transverse hole of the Coupling 5. The Pulley and the Contrate Wheel 8 are both free to turn independently of the driven Rod. They are secured by means of two ½″ Bolts, each of which is equipped with three Nuts, one immediately behind the Pulley and one on each side of the Contrate Wheel 8.

The unit formed by the Pulley and Contrate Wheel 8 is so placed upon the Rod that the teeth of the Contrate Wheel are in constant engagement with the ½″ Pinions 4.

The movement of the Pulley Wheel is controlled by a friction brake consisting of a length of cord, one end of which is tied to an Angle Bracket bolted to the base of the model and the other to a Threaded Boss 10 mounted on a Threaded Rod journalled in a convenient position near the Wheels. This Rod carries a hand wheel 11.

When the brake is in the "off" position, the Pulley unit is free to revolve. Hence if power is applied to the right-hand Contrate Wheel the Pinions 4 commence to turn upon their axles, driving the Contrate Wheel 8 in an opposite direction and no movement is imparted to the Rod passing through its boss. If the hand wheel 11 is rotated in a clockwise direction, the Contrate Wheel 8 becomes increasingly difficult to turn, and the Pinions 4 commence to climb round its teeth, thereby rotating the Coupling 5 and its Rod.

It will be seen from the above that by means of this clutch the power can be applied to the load very smoothly and without shock, for the left-hand Rod commences to rotate immediately the resistance on the Pulley becomes greater than the load. The speed of the latter Rod increases in proportion to the increase in the resistance on the Pulley and maximum speed is reached when the movement of the Pulley ceases altogether.

The type of brake used may vary, of course, according to the requirements of the particular model on which the device is incorporated, but the screw-operated brake is the best in nearly all cases, for it permits of the gradual application of the retarding effect.

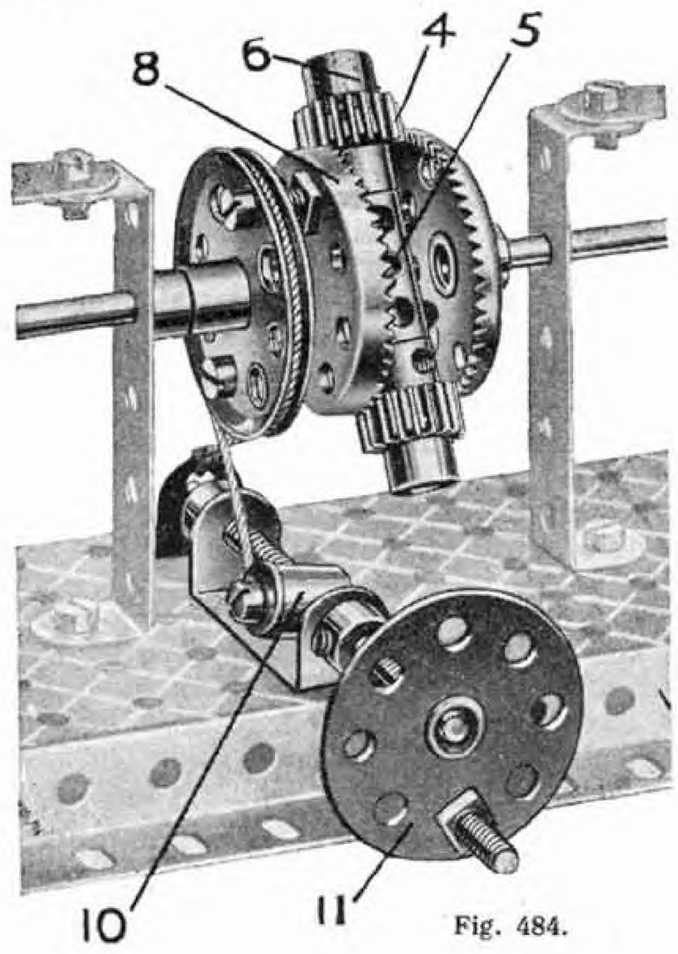
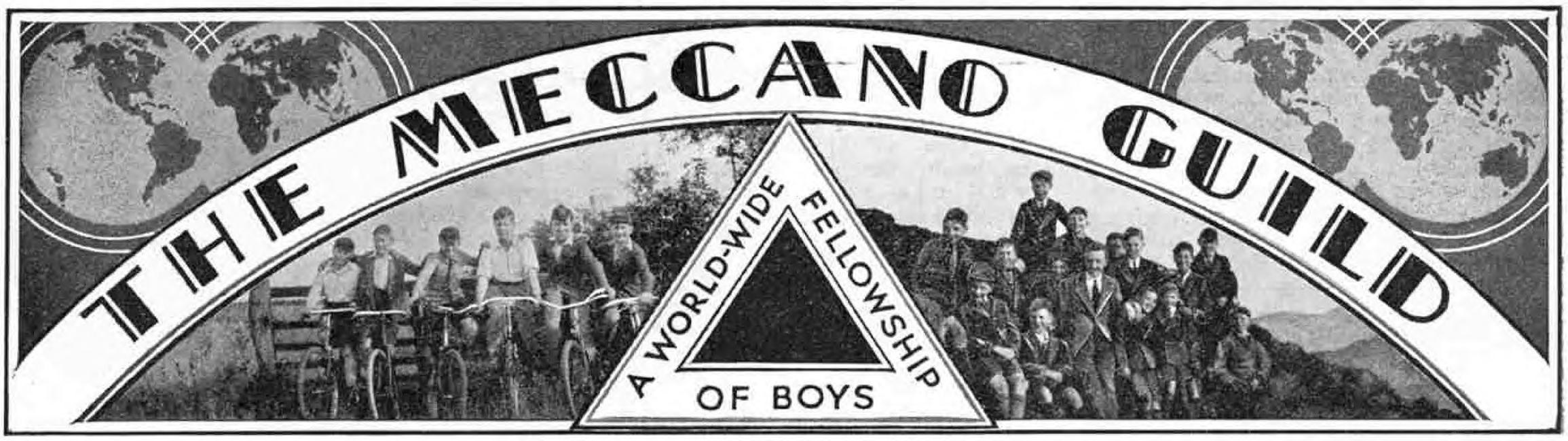


Fig. 484.



A Time for Recruiting

September is the time when Clubs and Branches pass once more from excursions, games and other outdoor activities to model-building and hobbies that are enjoyed indoors. Plans for the winter sessions and means of putting them into operation therefore should be considered now so that they can be submitted to a general meeting.

One of the first things to be dealt with is the question of membership. Enthusiasm naturally is greatest at the beginning of the Winter Sessions, which clearly is the best time for recruiting. Recruits must be obtained, for no Club or Branch can be really successful unless it is prepared to expand, and in any case young members are needed to replace those who leave because of business claims or removal. In looking for recruits it is best to work through existing members, each of whom should try to find new members among his friends. A special open meeting is useful when this method of recruiting is being practised. To such a meeting every member is required to bring a friend who can then see for himself how Meccano and Hornby Train enthusiasts enjoy themselves together.

Personal Efforts Best

Leaders and other officials can play an effective part in recruiting by personal effort, for not only can they bring along their own friends, but they can also make a special point of getting into touch with the boys introduced by their members, and making it plain to them that they are welcome.

A campaign of this kind should be supplemented by advertisement in some form. Local Meccano dealers and other shopkeepers often are willing to show notices giving details of the Club or Branch, with the address of the Leader and secretary. Such notices should be very neatly prepared, so that they will be a credit to the organisation and worthy of display in a shop or window.

If funds allow a small advertisement could be inserted in the local press. Here again much more can sometimes be done, for what the members of a Meccano Club do is news, and Editors of local papers very often welcome opportunities of giving reports of Club activities.

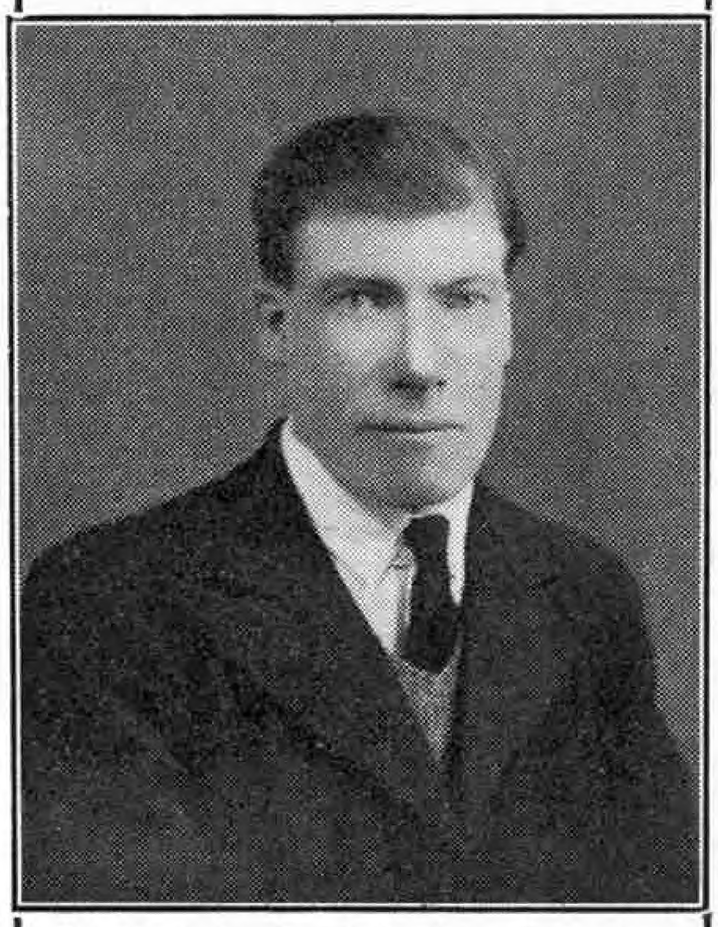
New Clubs in Evacuation Areas

A special problem is that presented by Meccano and Hornby Train enthusiasts who have been evacuated to safe areas. Practically all of these take their Outfits with them and in areas where there are already Clubs or Branches their arrival has opened up a splendid field for recruiting. In many such instances full advantage has been taken of the opportunities for getting new members, but I should like to see even greater activity in this direction.

New Clubs also might be formed. These would provide a really useful occupation during the winter months, and suggestions to establish Clubs would be cordially welcomed by teachers and others who have

Meccano Club Leaders

No. 103. Mr. F. E. Saunders



Mr. F. E. Saunders is Leader and secretary of the Folkestone M.C., of which he was the founder. The Club was affiliated in December, 1926, and the associated Folkestone Branch, of which Mr. Saunders is secretary, was incorporated in February, 1936. The two organisations work together and members have constructed many fine Meccano cranes and other models for use on the Branch layout, of which a harbour scene is a prominent feature. Model steamers also have been built. Monthly Model-building Contests are held, and there is an active Fretwork Section.

the task of looking after evacuees. I should like every Guild or H.R.C. member who has been evacuated to let me know at once what has been done in his district, so that I can support efforts to form Clubs or Branches by writing to those concerned, and sending them Guild and H.R.C. literature.

Recalling Older Members

One thing that should not be overlooked at this time of the year is the necessity for gathering in former members who for one reason or another have not been prominent in Club or Branch life during recent months. An experienced member is always a great asset, and no old members should be allowed to slip away without some enquiry.

The best ambassador in cases of this kind of course is the Leader himself, and he will find it a great advantage to make a personal call at the member's home, where his parents usually will be found helpful. Some Leaders make a practice of visiting the parents of all their members at this time of the year. This is good if the time can be spared for it.

Club Cards and Recruiting Medallions

Leaders and secretaries should now overhaul their stock of Club and Branch literature in order to make sure that they have sufficient number of membership and subscription cards and of report forms. Further supplies will be forwarded to them if they let me know what they need.

I also wish to remind Leaders that their recommendations for special Merit Medallions for the Spring and Summer Sessions should be sent to me at the earliest possible moment. In each club two of these Medallions are available for each Session, and any work that has been to the advantage of the Club can be rewarded by their presentation. Good model-building, prominence in arranging outdoor meetings, successful recruiting and meritorious service in an official position are among the many activities that qualify for the Merit Medallion, on which the name of the member to whom it is awarded is engraved.

Proposed Club

An attempt is being made to establish a Meccano Club in St. Neots, and boys interested should communicate with the promoter, whose name and address is given below.

ST. NEOTS—M. Roberts, Cross Hall Farm, St. Neots, Hunts.

Proposed Branches

The following new Branches of the Hornby Railway Company are at present in process of formation, and any boys who are interested should communicate with the promoters, whose names and addresses are given below.

BELVEDERE—Mr. F. E. C. Wood, 67, Picardy Road, Belvedere, Kent.

LEICESTER—E. Cooper, 145a, Canon Street, Melton Road, Leicester.

NEWCASTLE-ON-TYNE—J. Gate, 595, Welbecker Road, Walker, Newcastle-on-Tyne 6.

NORTHWICH—R. Owen, 6a, Gadbrook Road, Rudheath, Northwich, Ches.

Branches Recently Incorporated

397. BIRMINGHAM—Mr. E. J. Mee, 96, Langleys Road, Selly Oak, Birmingham 29.

398. IMPINGTON—G. D. Edward, Esq., The Village College, Impington, Cambs.

Club and Branch News

Branch News

Islington.—Recent meetings have been devoted to the running of goods and passenger services, with interesting shunting operations. Additional trains are run regularly to represent rush hour traffic. A special feature is that each member takes his turn in arranging proceedings. Fretwork, Stamps and Rambles also are enjoyed. Members are making weekly contributions to the "*M.M.*" Radio Fund for the R.A.F. *Leader:* Mr. V. Miller, 541, Liverpool Road, London N.7.

Rudheath (Northwich).—The Branch has now been incorporated. It has been decided to build up a non-continuous layout representing the section of the C.L.C. between Manchester and Chester, and at present this has one intermediate station. Running is to commence shortly, and timetables are being worked out. *Secretary:* Raymond Owen, 6a, Gadbrook Road, Rudheath, Northwich, Ches.



A group of officials and members of the Hornsea M.C., which was affiliated in April 1930. Mr. R. W. Shooter, Leader, is seated in the centre, with P. Richardson, secretary, and Mr. A. Tawn, Craftsman and Deputy Leader, on his right. Mr. D. Parker, Engineer, is on the Leader's left. The Club has a long record of successful meetings, and the programme followed is remarkable for the variety of its attractions, including games, lectures, scientific experiments, woodwork and cinema shows.

Dumpton House School.—Steady progress is being made, and new members have been introduced. Meetings are held regularly, with good attendances. An Exhibition is now being planned, and a play is to be presented at an entertainment. The play is being written by one of the members. *Secretary:* J. P. Oboussier, Crichel House, Nr. Wimborne, Dorset.

Folkestone.—Meetings are being continued in spite of difficulties, and the Branch room is to be kept open for summer train operations on the Branch layout. Meetings are being held twice weekly. *Secretary:* F. E. Saunders, 19, Dover Road, Folkestone.

Rosedale (Birmingham).—A start has been made with the redecoration of the Branch room. When this has been completed a new track will be constructed for the use of Junior members. The design and erection of this is being carried out under the supervision of a Senior member. A camp owned by two Senior members has been placed at the disposal of the Branch. A Stamp Section has been formed, and is making excellent progress. *Secretary:* L. A. D. Hamblin, 19, Katherine Rd., Bearwood, Birmingham.

Blackpool (North Shore).—Track laying has been continued, and the up line has now been completed and opened to traffic. The engine shed also is complete, and track operations are being carried out to a timetable that covers a period of an hour. Improved performances have been obtained by overhauling and cleaning all locomotives and stock. Outdoor meetings have been devoted to cycle trips to places of interest. *Secretary:* J. R. Irvine, 8, Dudley Avenue, Blackpool.

Clapham Common.—An Hornby electric layout has now been brought into operation. The track of this is to be doubled, and a timetable is to be drawn up for operations on it. An interesting Talk on railway working was given by Mr. A. Shepherd. Enjoyable outings have been held. One member has been called up, and the Treasurer has left because of evacuation, but their places have been filled by recruits. Books of railway interest have been presented to the Branch. *Secretary:* K. Maycock, St. Barnabas Vicarage, Clapham Common, London S.W.11.

Monkstown (Co. Dublin).—The railway has been re-erected and new isolating switches have been fitted. One locomotive was involved in an accident, which made a visit to the "shops" necessary. Timetable operation will be resumed when all the Branch engines are again available, and in the meantime emergency services are being operated. A Cycling Section has been formed, and was very active during August. A Photographic Gallery has been instituted, to consist of prints of snaps of Branch operations and of other items of railway interest taken by members. *Secretary:* R. D. Pierce, 20, Monkstown Road, Monkstown, Co. Dublin.

Acton.—A plan for the Branch layout has been approved after careful examination of a scale drawing, and construction is being commenced as soon as materials are available. Excellent Lectures have been given on "*The Great Western Railway*" and "*The East Coast Route.*" Competitions and Games also have been arranged, and rambles have completed an interesting programme. The club has removed to new headquarters. A group photograph for publication in the "*M.M.*" is to be taken. *Secretary:* S. W. Simmons, 37, Derwentwater Rd., Acton, London W.3.

South-West Hounslow.—Very successful meetings have been held, many of them out of doors. A good Branch room has now been secured, and a track has already been laid down. Meetings were few while School examinations were in progress, and members have now turned to Branch work with enthusiasm. At one of the outdoor track meetings a special feature was made of a shuttle passenger service which was run with great success! *Secretary:* R. Bower, 12, Walnut Tree Road, Heston, Middx.

Kinglassie.—The Branch Exhibition in aid of the "*M.M.*" Radio Fund was very successful. In addition to the Branch railway there was a realistic Dinky Toys Aeroplane display, in which effective use was made of model buildings made by members, sand and pools of water. Meccano models also were on view, and excellent use was made of a display of Dinky Toys. The Exhibition is to be repeated at a later date in aid of the Red Cross Fund. *Secretary:* W. Duncan, "Helendhu," Kinglassie, Fife.

NEW ZEALAND

Wellington West.—It has been decided to change gradually from Gauge O to Hornby-Dublo, and to make the Branch layout an electric one. Plans have been made for installing a turntable and for renewing rolling stock, and rules have been laid down for train operation and members appointed to various positions. A Library has been formed to contain all current railway magazines. A Monthly "Supper Night" is arranged. At one of these coal specials were run, and the tablet system for single line working was in operation. At another meeting a display was made of blueprints of New Zealand Railways locomotives. More colour-light signals have been installed. *Secretary:* K. R. Cassells, 26, Sugarloaf Road, Brooklyn, Wellington, New Zealand.

Club Notes

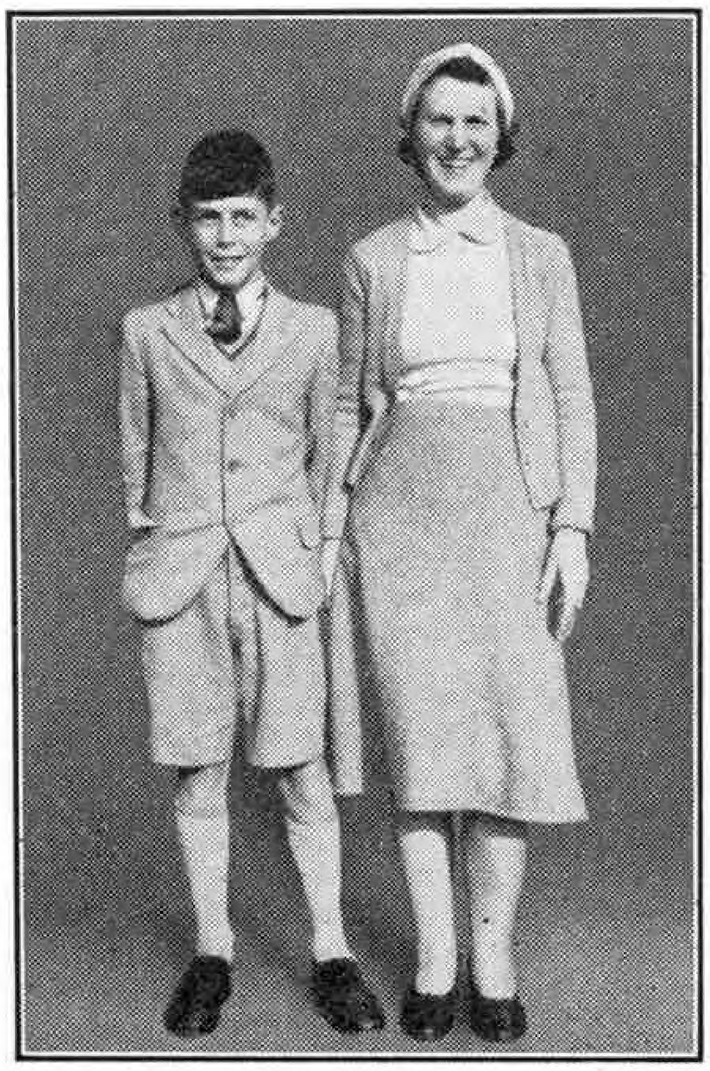
Blundellsands M.C.—The chief feature of recent meetings was the Club's Exhibition in aid of the "*M.M.*" Radio Fund. A Hornby-Dublo layout and several Hornby Gauge O railways were in operation, and an excellent selection of Meccano models was displayed. A model aerodrome with camouflaged hangars and Dinky Toys aircraft was a special attraction. Members enjoyed making preparations, in which they displayed skill and thoroughness, and a further Exhibition is to be held as soon as possible. Model-building Nights have been started, and other meetings have been devoted to demonstrations of models built at home by members. Mr. Curtis, who is now in charge of the Club, gave a Film Show that included travel and news pictures. The secretary gave a Talk on "*The Rise of the Film Industry.*" Club roll: 28. *Secretary:* J. K. Noel, 24, Lancaster Avenue, Liverpool 23.

Kingston-on-Thames M.C.—Membership is increasing satisfactorily, and good progress is being made now that a more suitable Club room has been secured. A model dock scene is being constructed. This includes Meccano models and Hornby tracks, all constructed or laid down by members to fit into the scheme. Club roll: 16. *Secretary:* P. Avis, 16, Willoughby Road, Kingston-on-Thames.

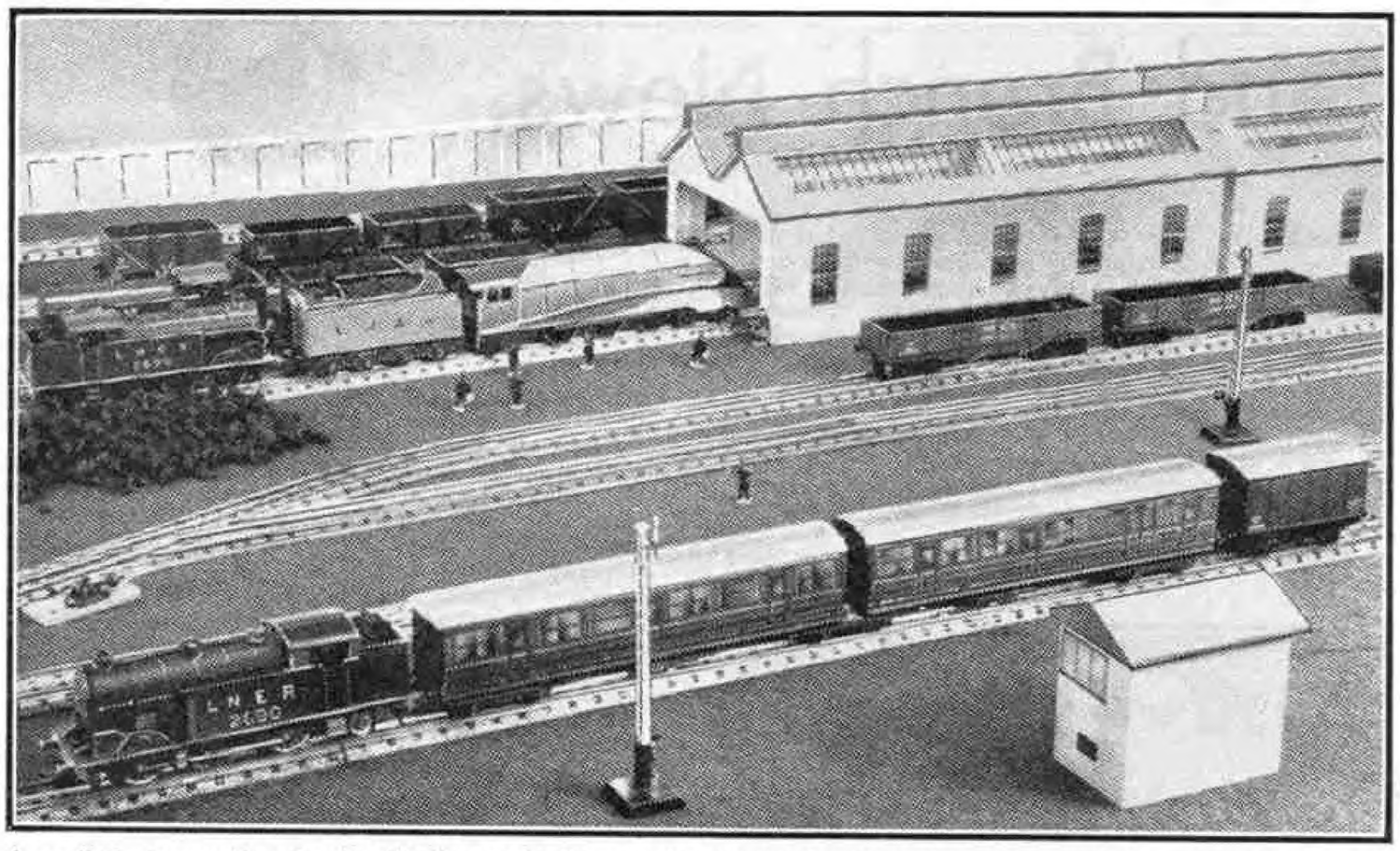
Exeter M.C.—Steady work is being continued with special attention to model-building. Three indoor Games Tournaments are continuing satisfactorily. A special souvenir card is being issued to commemorate recent successes by the Club. Mr. M. C. Hodder, Leader, is visiting the parents of all members, an excellent scheme to enlist their interest and support. Club roll: 55. *Secretary:* M. F. Golesworthy, 122, Old Tiverton Rd., Exeter.

AUSTRALIA

Maylands M.C.—Excellent displays were prepared by the three sections of the club for the Factions Exhibition. The Green and Gold Faction arranged a railway workshop display, which included models of lathes, drills and milling machines. The Red and Blue exhibit was a miniature R.A.F. island base, while a cement works was the subject chosen by the Blue and Gold Faction. On this occasion the Green and Gold Faction won the contest. The Club now possesses a Cinematograph Outfit, and members concerned have become skilled in its operation. An Exhibition has been planned. A start has been made with the construction of models, including a hammer head crane and a miniature of the "*Empress of Britain,*" and these have already been displayed in shop windows. Club roll: 34. *Secretary:* W. E. Petersen, 1, Warne Street, Maylands, Perth, Western Australia.



Mrs. J. Scales, Chairwoman of the Upper Wharfedale Branch No. 381, with D. H. Scales, secretary. This Branch was incorporated in September 1939. An excellent track has been laid down, and on this interesting operations are carried out regularly. Cycle runs and picnics also are arranged.



A realistic locomotive depot with the main line passing in the foreground of the illustration. The Two-Coach Articulated Unit is being used here to form a suburban train.

Fun with your Hornby-Dublo Railway

Signals and other Suggestions

AS readers of the *"M.M."* know, the owner of a model railway system is not content with running his trains along a more or less plain track. He wants to do much more than this, and one of the greatest attractions of the model railway hobby is the variety of interests that it presents. Thus in developing a system on realistic lines one is never at a loss for some scheme to try out or some fresh item to be attended to, quite apart from the main interest of operating the system as it develops in as realistic a manner as possible.

A glance at the illustrations on these pages will show a variety of different subjects, each of which deserves the attention of the Hornby-Dublo railwayman. Stations and other accessories of the building type are prominent. We have already given some attention to the arrangement of stations in recent issues, but it is necessary to point out the interesting arrangement shown in the lower illustration on the opposite page, where components of the City Station Outfit have been used without the roof span portions. An excellent "open" station is the result, which certainly gives the maximum degree of accessibility in working the trains in and out.

Similarly, in the illustration showing the arrival of an army detachment "somewhere in England," the large island platform is composed of the centre platform pieces of the City Station Outfit. These pieces are ideal when it is desired to arrange a spectacular display of miniature figures such as the Tank Corps Personnel lined up in the illustration. The use of the ordinary Hornby-Dublo Island Platform in this instance too is of interest. Only one side of the Platform is served by a track. This leaves the other side free, so that road vehicles can be backed up to it in a similar manner to a goods loading "bank." For a platform used only for passenger traffic purposes this is hardly correct, but where, as in this instance, special traffic, either military, excursion, perishables and so on is to be handled, the scheme is quite a good one.

The Hornby-Dublo Engine Shed is another adaptable building. Sometimes it is desirable to provide more accommodation at a locomotive depot than is afforded by a single Shed. It may be possible, if space permits, to have two Sheds, one at each end of the locomotive yard for tender and tank locomotives respectively. As an alternative it is not a bad plan to use two Sheds placed end to end, the complete building then forming one large shed in which engines of both types are stationed.

The Engine Shed can be used successfully also as a carriage shed where passenger rolling stock is cleaned and attended to. In addition one or two readers have suggested its use as a depot for Dinky Toys Motor Buses!

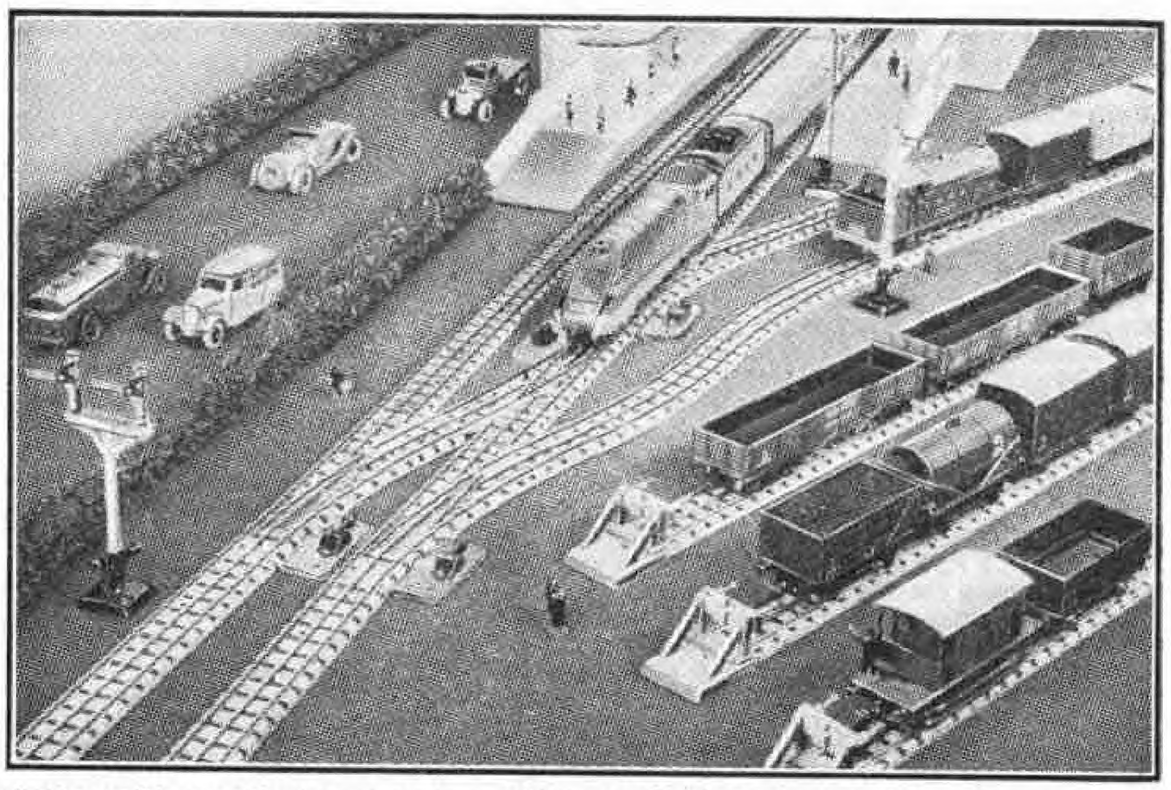
The signalling of the ordinary stretches of main line and of passing stations is usually straightforward enough, and in previous articles we have given some attention to the uses of Hornby-Dublo Signals, both hand-operated and electrically-operated. At terminal stations and in the neighbourhood of any junctions however various interesting points crop up, but in most cases the adaptability of the Hornby Dublo Signals gets over any difficulty.

In the lower illustration on the opposite page, showing a terminal station, there is a Hornby-Dublo Junction Signal at the head of the centre island platform. This is being used for its normal purpose, that of providing for any divergence from the straight track either to the right or to the left. In this case the right-hand semaphore applies to the main track, on which a suburban train has just arrived at the station. If the coaches are to be pushed out of the station beyond the crossover, so that the engine can run round its train, then the Points of course will be left set for the straight and the right-hand semaphore will be pulled "off." On the other hand, suppose that the train is to be taken over the crossover, after the outgoing train has left: the crossover points will then be moved and the left-hand semaphore will indicate to the driver that the road is clear for him.

In the same illustration there is another Junction Signal, placed between the track serving the platform separated from the rest of the station by a wall and used for perishable and parcels traffic, and the track on which coal wagons are standing. Here the Junction Signal is used because of the convenience afforded by it in having two semaphores mounted on the one main structure. The single main post of this type of signal fits conveniently between the two tracks to which the semaphores apply. The left-hand semaphore controls outgoing movements from the "parcels road" and the right-hand one similar movements on the "coal road."

An interesting junction layout is shown in the lower illustration on this page, and the signalling arrangements should be noted. Signals are placed so that the points are correctly protected according to the direction of the trains, traffic keeping of course as usual to the left hand track. The "up" express train hauled by the streamlined "Pacific" is signalled through the junction by the Double Arm Signal. The fact that both semaphores are "off" has no connection with the junction itself; it shows that the next home signal to be encountered is showing "line clear" also. Actually the distance to it is so short that the "distant" semaphore, normally occurring before the home signal, is placed on the same post as the previous home semaphore.

The freight train in the illustration referred to is held at the home Signal that governs movements off the branch line to the main line. This signal should only show "line clear" when the trailing Points



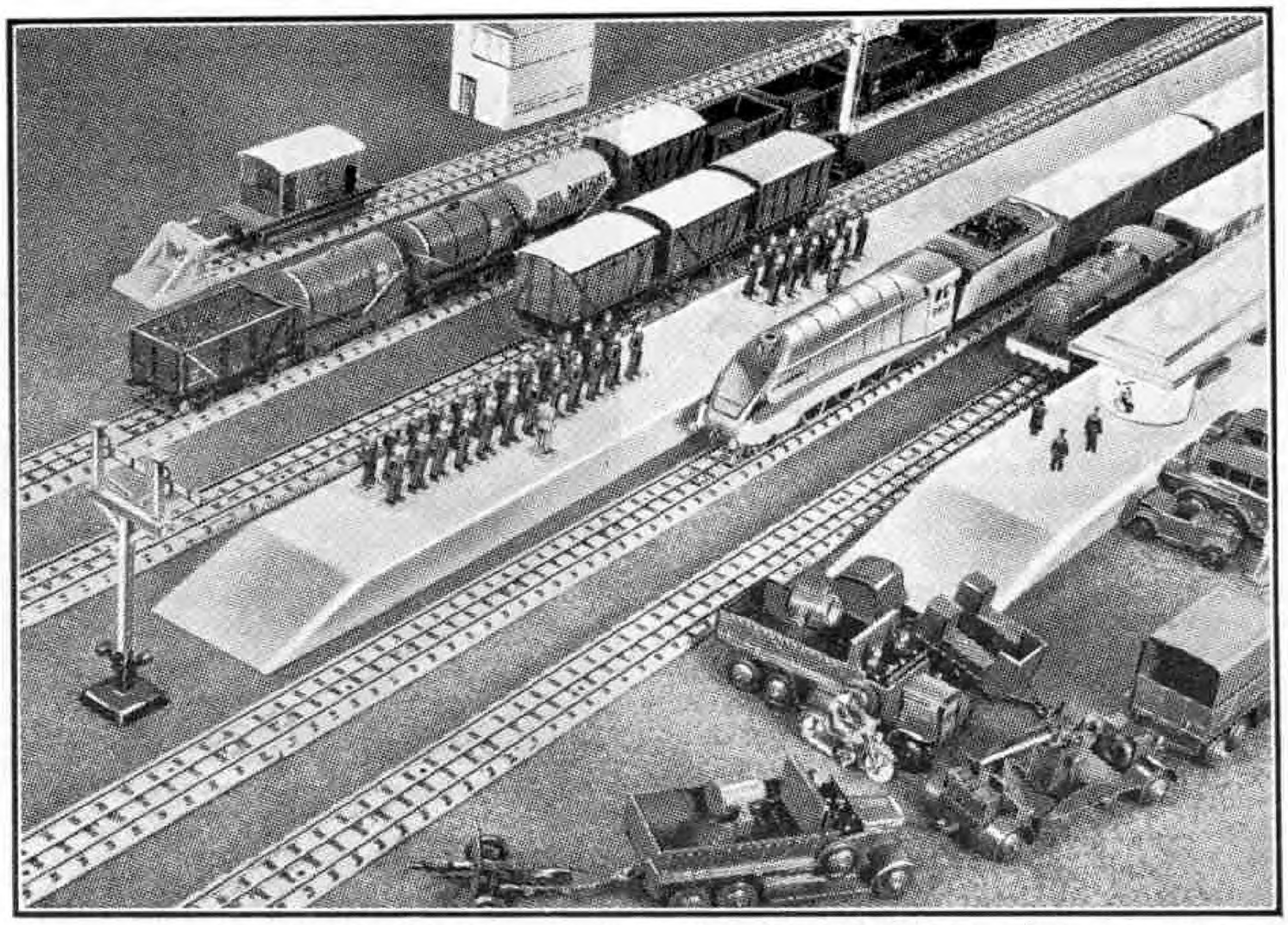
A fine double junction layout made up of Hornby-Dublo track components. The signalling of this layout is referred to in this article.

leading in from the branch line are correctly set. In actual practice any conflicting movements between the various points and signals are prevented by means of interlocking. The left-hand semaphore of the Junction Signal shown refers to the "down" main line straight ahead through the junction; the right-hand semaphore governs movements from this main line across the other track and so into the branch.

The actual formation of the double junction turnout is interesting, for it is made up of standard Hornby-Dublo track components. Such a junction is quite a good arrangement where the branch line is not connected up again to a symmetrical main line track. As the radius of all the Points is the same, the outer track of the curved branch is not perfectly symmetrical with the inner track; however, where the branch line goes off and remains an independent part of the layout the arrangement is quite satisfactory. At the junction the two main lines are connected by Points in the manner usually used in forming a crossover. The down branch line is then led off from the up main line by means of Points placed ahead of the crossover, and the up branch line comes in by another set of Points in the rear of the crossover.

In the illustration the streamlined locomotive is passing over two sets of Points that take the place of the diamond or acute-angle crossing used in actual practice. Actually the use of two sets of Points in this way, forming in effect a movable crossing, is an advantage in miniature, for trains can be transferred from the down to the up main line and vice-versa if required. With a diamond crossing trains from the down main line can simply cross the up line to the branch.

In the illustrations that appear month by month in these pages good use is invariably made of various Dinky Toys in conjunction with the Hornby-Dublo railway material. The accompanying illustrations are good examples, but apart from these many interesting schemes can be developed. At the present time the scene depicted in the upper illustration on this page is of special interest. Here good use is made both of the vehicles and personnel



"Somewhere in England"! A Dinky Toys detachment of the Mechanized Army arrives at a station on a Hornby-Dublo Railway.

of the Anti-Aircraft and Tank Corps Sets. The parade of the men on the station platform is very effective, and is specially interesting when these figures are used in conjunction with the Hornby-Dublo Railway Staff.

The use of various road motor vehicles of the Dinky Toys Series at the lineside and on the layout generally is quite familiar. A further extension of this road transport activity that can be most realistic and interesting is the development of road motor services in connection with the trains. Younger members of the "staff" in particular are keen on this work and usually enjoy providing the necessary "motive power." Of the various vehicles the Motor Bus, Dinky Toys No. 29c, is particularly suitable for use, and a regular "bus line" associated with the railway can be instituted. When this is the case it is as well for all the vehicles to be obtained finished in the same colour, according to the livery chosen for the purpose. If desired the Buses can be painted by the miniature railway owner in some colour or style selected by him.

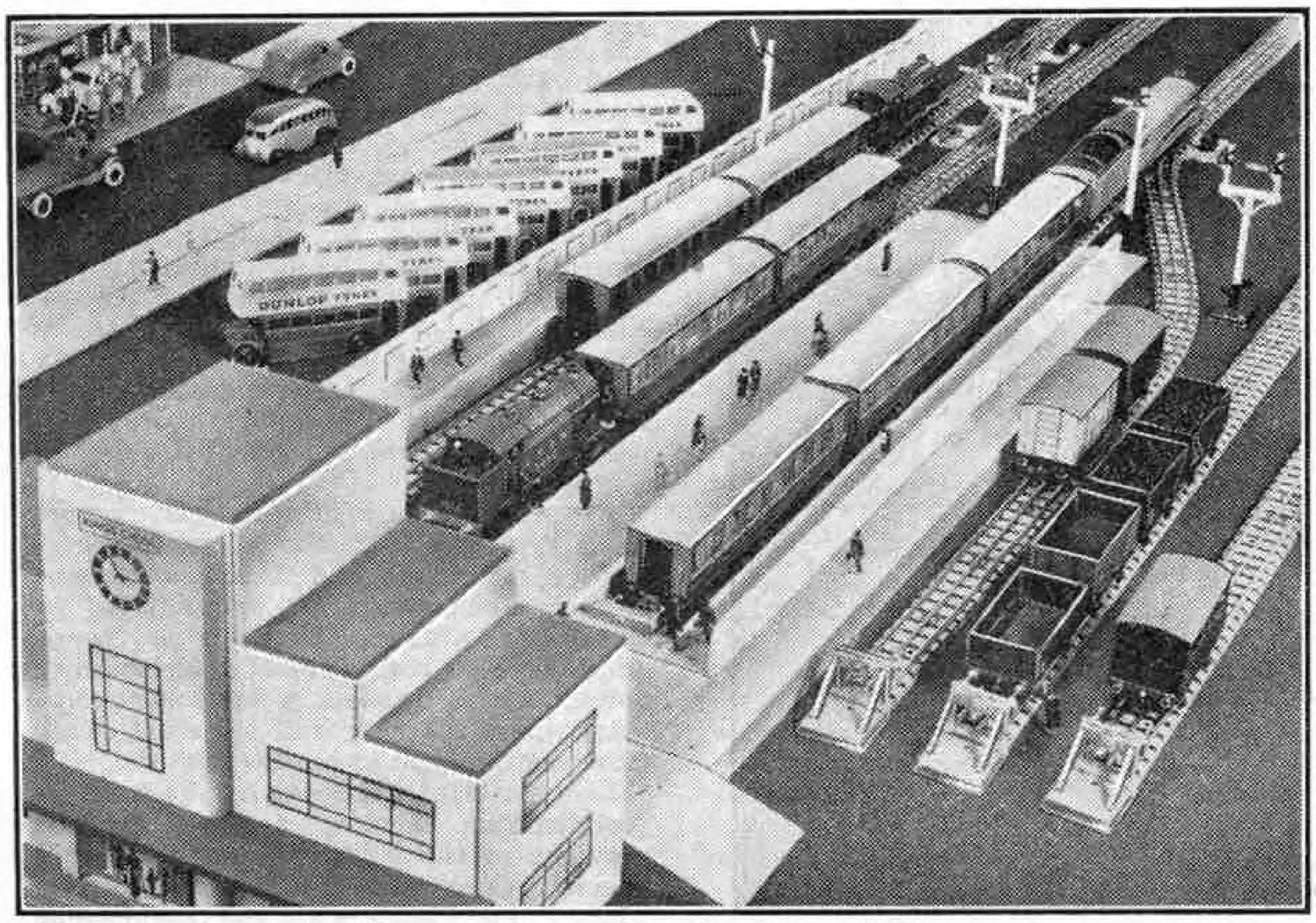
Naturally where several different "Bus Companies" or operators are concerned a number of vehicles in the various shades available will be desirable. It really is a matter to be settled by the owner of the line according to the organisation of his "road transport department." While speaking of motor buses we must not forget the Streamlined Bus, Dinky Toys No. 20b. This is an ideal vehicle to use for combined "Rail and Road Excursions," and several of them awaiting the arrival of an excursion train at a station would make quite a realistic sight.

Other vehicles that are specially suitable are the various Motor Wagons. These again can be "Company's vehicles" or else "privately owned." In either case they can be used effectively in connection with the freight traffic of the line. Then there is the Dinky Toys Market Gardener's Van which, with its high open sides, closely resembles a livestock float as used extensively on the roads to-day. It can be employed as such on a Hornby-Dublo railway layout, especially in connection with the Cattle Trucks D1 that were introduced last season.

Similarly the various Motor Vans of the Dinky Toys range can be used in conjunction with the Meat or Fish Vans D1 for perishable traffic, and parcels can be dealt with by means of the motor Delivery Vans working with the ordinary Goods Vans D1.

Motor vehicles require the service of the Motor Tank Wagons to bring their fuel supplies and Service Stations and Pumps to attend to them. Various developments can be worked out according to individual taste, and where the "road business" is extensive the suggestion mentioned previously in this article regarding the use of the Engine Shed as a road motor depot can be made use of.

It must not be overlooked too that motor cars can frequently be parked on the railway station premises.



A novel terminus station with open platforms. Dinky Toys Buses wait for passengers from the station.

Hornby Tank Locomotives and their Work



A Hornby No. 2 Special Tank Locomotive on a train of corridor stock. This represents the use of a tank engine on a "through portion" of an express train, as suggested in this article.

IN actual railway practice the tank type of locomotive plays a useful and interesting part. It does not attract much attention from the traveller, perhaps because of its very familiarity; but at the same time it is just as necessary to its owners as the more advertised tender engine. It forms a self-contained unit; carrying its fuel and water supply on the same main chassis, it requires no separate tender. It is mobile and compact, and it is not necessary to turn it round each time it reaches the end of a journey. Many tank locomotives too are equally at home on goods or passenger trains.

In miniature similar advantages apply, and there are in existence several model railway systems on which the tank type of locomotive is used exclusively. This state of affairs may be compared to the well-known practice of the "Tilbury" section of the L.M.S., where the tank engine reigns supreme, or practically so. In miniature of course the preference of the railway owner, rather than the character of the system, may determine the type of engine used.

The Tank Locomotives of the Hornby Series are well known to Hornby railway enthusiasts, but a review of them and their duties will probably be interesting, especially to the less experienced miniature railwaymen. For the benefit of the latter, who are usually the younger readers of the "*M.M.*," and who therefore are usually restricted in their choice of motive power, we will commence with the smallest and least expensive Tank Locomotive in the range, the EM320.

The EM320 Tank Locomotive, like its clockwork-driven counterpart the M3, is a four-wheeled engine with all wheels coupled. There is much to be said for this arrangement on a model system. There are no bogies or pony trucks to settle on the track when operations are commenced, and this appeals particularly to very young H.R.C. members. The moderate length, too, of the EM320 makes it of special value on a layout laid with 1 ft. radius rails, or perhaps including sidings or a branch on which such rails are used.

With a single EM320 or M3 Tank Locomotive and a few items of rolling stock quite interesting and realistic working is possible, especially if the railway is of a local or even "branch line" character. For more developed systems several of these engines can be employed with advantage, and with a "fleet" of them interesting workings can be planned and carried out.

Similar operations are possible with the E120 and Hornby No. 1 Tank Locomotive which is similar in size and type to the EM320. The No. 1 type is however rather more powerful, and as far as clockwork railways are concerned the No. 1 Tank has the advantage that it can be braked or reversed from the track by means of the AB2 Brake Rail. It should be noted however that the E120 and No. 1 Tanks require 2 ft. radius rails to give the best results. They can get round 1 ft. radius curves, but they are not so happy on them as is the M3 type that was designed as a "1 ft. radius" engine.

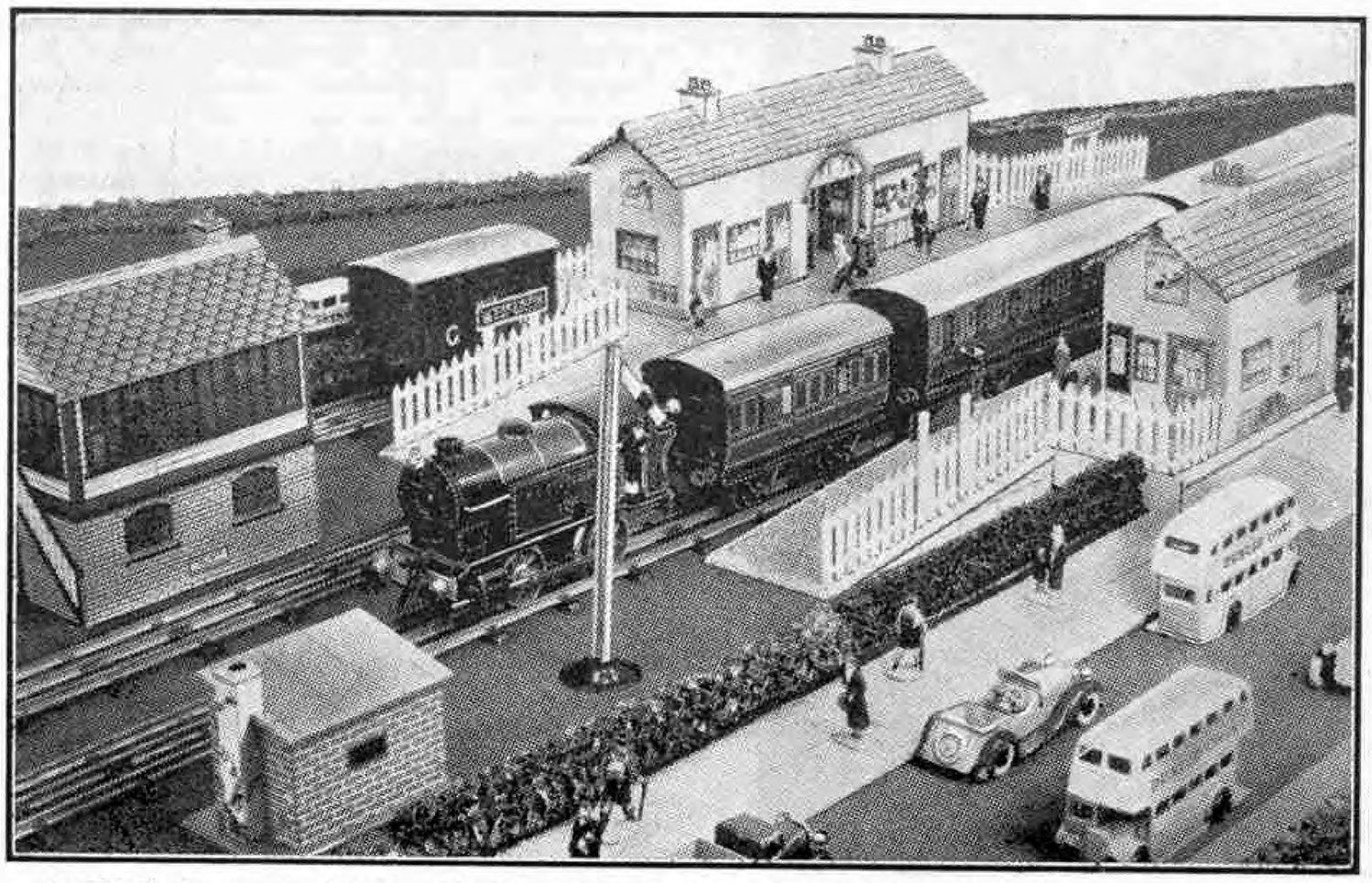
In making up trains for the smaller types of Hornby Tank Locomotives the four-wheeled No. 1 Coaches are probably the best vehicles to use. They are realistic in appearance, their size and weight are in keeping with the character of the engines, and the formation of suburban "set trains" with them is easily arranged. Where bogie stock, say of the Hornby No. 2 type, is available also, it is usual to keep these together, using the smaller four-wheelers for less important or branch trains. However, the two types of Coaches can be mixed if required, especially if a train, normally made up of bogie vehicles, requires strengthening to cope with "rush period" traffic.

Coming now to the larger types of Hornby Tank Locomotives, we have first the E120 Special type and then the E220 Special and their corresponding clockwork partners. The electrically-driven engines of these types have the great advantage that they are provided with the now well-known Hornby Automatic Reversing motors. This feature is invaluable in suburban train working where quick run rounds at each terminal point are essential in intensive operations.

The E120 and No. 1 Special Tanks represent very well the medium-sized tank engines so popular on British Railways. Either goods or passenger trains can be handled, and in miniature the E120 Tank makes a splendid "heavy shunter." Rails of 2 ft. radius are essential as the length of wheelbase is such as to prevent working on sharper curves.

A special feature of the E120 Special Tank type is that, although powerful, it is not a big engine, and therefore does not require much space for manœuvring in stations and sidings. This helps the "space question" that bothers most model railway owners, and also assists in timetable operations where the easy and therefore quick movement of light engines is essential.

Longer-distance suburban and "residential" services are the special province of the E220 Special and No. 2 Special clockwork Tank Locomotives. These types of engines are identical, except for the difference in their motive power.



An M3 Tank on a local train. Both No. 1 and No. 2 Coaches are included in the make-up of the train.

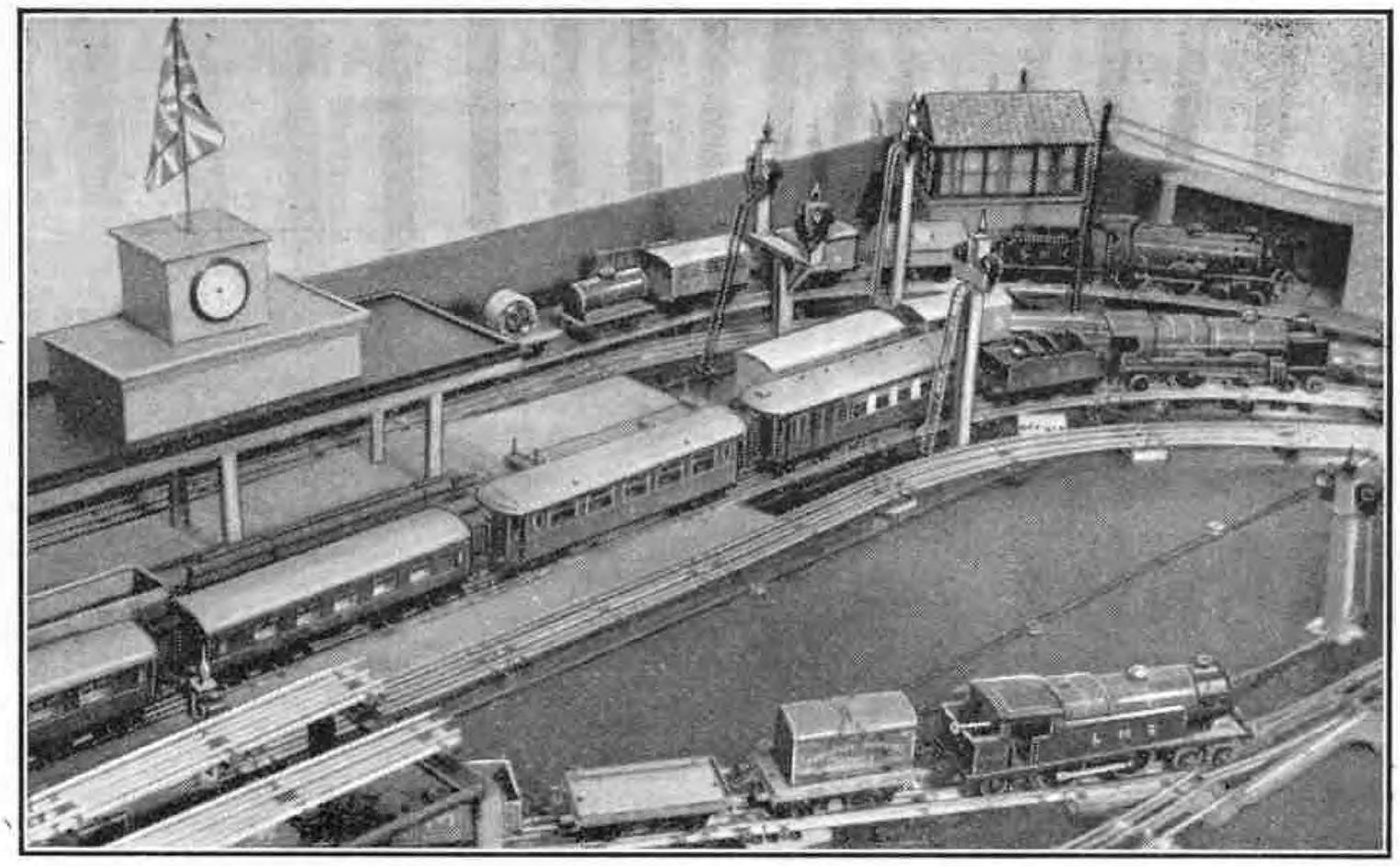
An Electrically Signalled Hornby Railway

THE illustrations to this article show sections of a very workmanlike Hornby railway designed and built by Mr. A. Casebrook of New Bradwell, Bucks. The layout occupies the entire floor space of one room, which measures 12 ft. square. It consists of four oval-shaped tracks of Hornby tinplate rails, with an overall running distance of 160 ft., and these four tracks constitute two up and two down lines for fast and slow traffic. From the down slow line, an additional track is taken obliquely across the centre of the oval, rejoining the main track at the opposite side. There branch off three goods sidings, and tracks serving a cattle loading platform and a coal depot from the diagonal connecting line; and on one side of the layout there is an engine shed, which accommodates two locomotives. At this point also is a cleaning shed and the turntable.

Crossovers are laid at various points on the layout, and these allow trains travelling in either direction to be changed over to any desired portion of the layout in a realistic and railwaylike manner. In addition, an overhead track, 43 ft. in length, has been provided for a "Metropolitan" train service. This track is complete with two through stations and one double line terminus. The overhead line has been laid on a structure representing both girders and brickwork.

At the present time there are three complete trains running to a timetable. These include *"The Royal Scot,"* hauled by the famous Hornby E320 "Royal Scot" engine; a goods train in charge of a Hornby E220 Special Compound engine; and another goods train hauled by the Hornby E220 Special L.M.S. Tank engine. When a journey is completed, the wagons and vans of the goods trains are shunted on to the goods line and the locomotives return to the engine shed. At the end of a trip these locomotives are manœuvred into position for further duties.

This model railway is electrically operated from the mains supply and can be efficiently worked in complete darkness by means of colour light signals. The layout is divided into several sections that can be controlled separately, so that a train can be stopped in any one section while independent movements are being made with other traffic on adjoining sections.



A through goods train and a fast "special" operating on the Hornby layout of Mr. A. Casebrook, New Bradwell, which is described in this article.

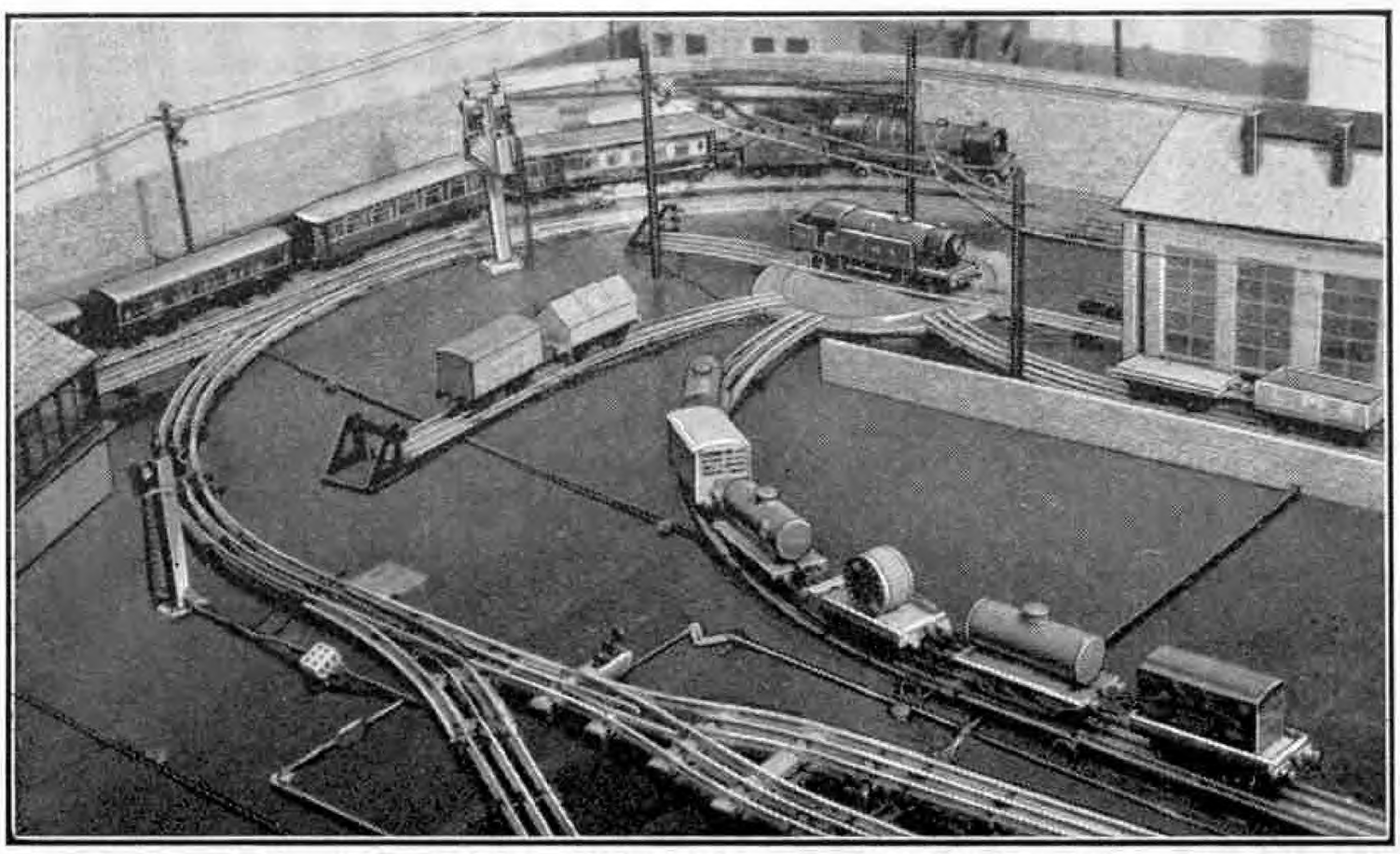
Power for the trains, points and signals is controlled by levers or switches on the control panel, and there is in addition a corresponding system of coloured indicator lights. For example, if the points become fouled during the movement of a lever, a light cuts out above the lever. At the same time the light signal covering the points shows red, and the power supply to that particular section is automatically cut off. To bring this system into operation over 400 ft. of wire were installed, and many hours of experiment and testing were necessary before perfection was attained.

All distant signals are fitted with repeaters on the panel. By this means the operator can tell whether the signals are working correctly, and the failure of a signal light to change is indicated by the failure also of the repeater. A series of coloured lights have been fitted in connection with the circuit breakers. On a circuit breaker being tripped, the lights show the operator which line is involved, so that the fault can be cleared with the minimum of delay.

Up to the present 10 signals and 12 pairs of points have been installed, and a further eight signals are to be added later. For the operation of these signals and points 150 cycle spokes have been soldered together, and over 1,000 ft. of wire have been used, together with a large number of Meccano 20 v. and 3.5 v. bulbs, 36 switches and over 50 porcelain wire connectors. The total number of 3.5 v. bulbs alone installed on the layout is 46.

All the accessories on the layout are illuminated, and the goods yards and the engine shed are floodlit. All the lights can be either dimmed or switched off entirely at a moment's notice by the movement of one switch. In connection with this a modern system of air raid warnings has been provided, and a very realistic effect is produced when the siren is sounded. All lights are dimmed, searchlights come into action, and the effect is heightened by imitation anti-aircraft fire!

The signals, the engine shed and the station building have been constructed from scrap pieces of material. The stations are complete with glass windows, hinged doors and other accessories. The central station is called *"Stanton Central,"* and the other two have been named *"Far Point"* and *"Lower Brad"* respectively. The whole of the layout is painted and made up to represent an actual public railway, and scenery is being prepared to place round the walls to give the effect of distance.



The realistic arrangement of Mr. Casebrook's Hornby railway is well shown in this illustration.



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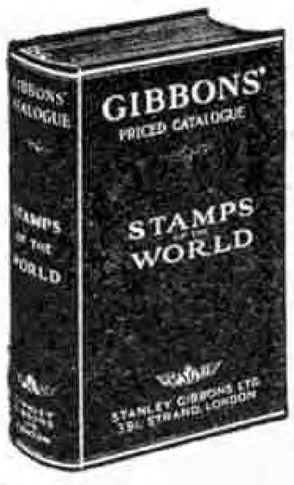
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STAMP COLLECTING

Railways in the Stamp Album

STAMPS with locomotive designs are probably the most popular of all with *"M.M."* readers who are collectors. A little over a year ago we dealt briefly with the wide range of such designs available for those who wished to build up a collection of stamps with a railway interest. Our previous article did not exhaust the subject, and so many countries have celebrated recently the centenary of railway operations within their borders that much fresh material has become available.



One specially interesting feature of the designs used for these centennial stamps has been the frequency with which locomotives built by Robert Stephenson have been portrayed. Thus Belgium showed *"Le Belge"* on the high values of the Centenary issue of 1935; Austria's first locomotive, named *"Austria,"* was shown on the 12 gr. value of the Centenary issue of 1937; and Germany showed *"Der Adler"*—in English "The Eagle"—on the 6 pf. stamp in its 1936 series. All of these were Stephenson engines.

British locomotives of later dates were featured in the Egyptian Railway Congress issue of 1933. Two of these also were Stephenson engines, and were brought into service in 1852 and 1859 respectively. A third was by Neilson, Reid and Co. and a



fourth by the North British Locomotive Co. Ltd., and these were introduced in 1862 and 1925 respectively. These stamps alone are sufficient to suggest the whole trend of locomotive development from the appearance of George Stephenson's *"Rocket"* down to comparatively modern times. The following additional details are worth recording, for the designs are among the best in the whole series of locomotive stamps.

The lowest value is the 5 m., and shows the earlier of the two Stephenson locomotives, a 2–2–2 with six-wheeled tender. The engine had two inside cylinders, 14 in. in diameter by 20 in. stroke, and the driving wheels were 5 ft. 0¾ in. in diameter. The 13 m. stamp shows the second Stephenson production, and is the most interesting design of the four. Again the wheel arrangement was 2–2–2, and the two inside cylinders were of 16 in. diameter and 20 in. stroke. The driving wheels were 6 ft. 6 in. in diameter. First introduced in 1859, this locomotive was employed for many years to haul the Khedive's Royal train. It was rebuilt for ordinary service in 1897 when it was stripped of its ornate decorations, renumbered No. 2—it was previously No. 41—and continued in service for another 10 or 12 years.

The 15 m. value shows a typical British locomotive by Neilson, Reid and Co. This also was a 2–2–2, and it had two outside cylinders with diameter of 17¼ in. and a stroke of 24 in. Its driving wheels were 8 ft. 2 in. in diameter. This was was one of three similar locomotives that were placed in service from 1862 to 1865 and put in some 30 years first-class service, being finally scrapped in 1895.



The last of the four stamps, the 20 m., shows an "Atlantic" engine with outside cylinders and 6 ft. 6 in. driving wheels. The first series, Nos. 26-60, was introduced in 1925, being built by the North British Locomotive Co. Ltd. The engines were so successful that further batches were ordered in 1926 from German manufacturers. These were numbered from 61 to 86.

Another interesting British locomotive is shown on the 4a. value of India's 1937 series, a set that is devoted to various methods of carrying mail. It is a "Pacific" with the outside valve gear excellently drawn. Details of the individual locomotive from which the design is taken unfortunately are not available, but both the Madras and Southern Mahratta and the Great Indian Peninsula Railways have engines of this type in service.

Another good "Pacific" design is in a series issued by Manchukuo last autumn to celebrate the completion of the 6,000th mile of the South Manchurian Railway's tracks. The design shows a front end view of the famous streamlined train *"Asia,"*



which operates a daily service between Harbin and Darien. On the train there are one composite baggage and mailcar, one second and two third-class coaches, a diner and a first-class observation coach, which brings up the rear.

Among the most interesting of recent issues are two designs issued by France in 1937 to celebrate the centenary of French railways. The inaugural run took place over a stretch of track between Paris and St. Germain with a Stephenson-built locomotive similar to the *"Rocket."* France preferred to illustrate modern engines in the two designs used for the centenary stamps, however. These were a 4–8–4 electric locomotive on the 30c. value, and a streamlined "Pacific" of the P.L.M. railway on the 1f. 50. The "Pacific" was one of a series of locomotives employed on the Paris-Mentone run, a journey of 690 miles scheduled to take only 10½ hrs. A curious feature of the electric locomotive on the 30c. stamp is that both arms of the pantograph are shown in contact with the conductor cable.

France has another series of interesting railway stamps. This is the 1901 parcel post series, which is not listed in Stanley Gibbons catalogue, although shown in the standard French catalogue, Yvert. Each of the six stamps of this series showed an excellent side view of a 4–4–0 locomotive fitted with Walschaerts valve gear. A striking point is the partial stream-lining of the locomotive, which was built in 1901!

Turning back for a moment to the German centenary issue, we find three very good designs of modern engines in addition to the old *Eagle"* to which we have already referred. The 12 pf. shows a "Pacific," No. 031–F–2, built by Henschel at Cassel in 1935, of the type used to haul the *"Rheingold Express."* The 25 pf. provides an excellent illustration of a

(Continued on page 438)

Stamp Collecting—(*Continued from page 000*)

Diesel-electric locomotive employed on the *"Flying Hamburger,"* which ran from Berlin to Hamburg, 180 miles in 138 minutes, thus making one of the longest non-stop runs in Europe. The 40 pf. depicts a streamlined steam locomotive.

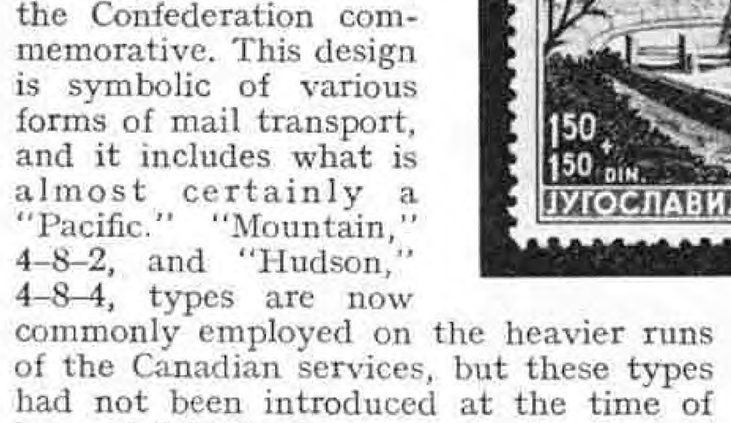
Another famous European express is represented by the 1d. 50 of Jugoslavia's 1939 series, issued to celebrate the centenary of postal services. This shows a "Pacific" of the type employed on the Paris-Istanbul run over the Jugoslavian section. The train is shown on tracks that run through the rocky gorge at Sidevac, along the banks of the Nishava River between Nish and Pirot.

Our story would not be complete without the inclusion of representatives of the many fine locomotive types used in North and South America. Our illustrations range from single-wheelers depicted on the 3c. value of Uruguay's 1895 issue, and an ancient "wood-burner" on New Brunswick's 1c. of 1860, the earliest locomotive design used on stamps, to the great modern engines used on the railways of Canada and the United States.

Canada claims what must be the smallest locomotive picture on a stamp. This appears on the 20c. harvesting design of the 1930 issue. The Canadian Post Office assures us that the locomotive is present in the design, between the first and second grain elevators, on the left of the design and in the centre respectively but we defy the keenest-eyed reader to spot it without the aid of a magnifying glass, and a very powerful one at that!

A more satisfying Canadian locomotive is shown on the Special Delivery issue of 1927, the Confederation commemorative. This design is symbolic of various forms of mail transport, and it includes what is almost certainly a "Pacific." "Mountain," 4–8–2, and "Hudson," 4–8–4, types are now commonly employed on the heavier runs of the Canadian services, but these types had not been introduced at the time of issue of this design.

United States designs include several excellent stamps for our collection, notably the 5c. of the 1912 parcel post series, which shows a mail train approaching a wayside mail delivery apparatus on which hangs a pouch of mail ready to be picked up by the train. The 2c. of the Buffalo



Pan-American Exhibition series of 1901 is another good design, showing a 4–4–0 locomotive hauling a train of four Pullman cars. The 3c. value of this series shows a postal clerk leaning from a sorting car in the act of hanging out a bag of mail to be picked up by an approaching wayside pick-up apparatus.

One of the best complete train pictures is provided by the 5c. stamp from Newfoundland's 1928 publicity issue, which shows a train on the St. Johns-Port aux



Basques run, a 547-mile journey made thrice weekly in each direction.

Among heavier locomotives, Bulgaria gives us a view of part of 2–12–4 T used for heavy haulage work over mountain grades. The view shows King Boris of Bulgaria, an ardent railway enthusiast, leaning from the cab. This stamp is the 7 1. value of the series issued in 1939 to commemorate the Jubilee of Bulgarian railways. The 1 1. shows a 0–6–0 locomotive of 1890 with inside cylinders and outside connecting rods; the 2 1. and 4 1. show a modern "Pacific" used for freight and passenger work.



The fact that this series is officially the Jubilee commemoration is curious, for the first Bulgarian railway actually was built in 1868 by a British syndicate and operated between the Black Sea port of Varna and the Danubian port of Rustchuk, a distance of 226 miles. We cannot explain the apparent discrepancy, but possibly the year 1888 is that in which the Bulgarian State commenced to operate railway services.

The subject might well be extended a little to include auxiliary subjects, such as the railway station designs on Russia's issue of February 1935, which marked the opening of the Moscow Underground Railway. The 10k. value shows a section of roadway, escalator and station, the 15k. a view of a station, and the 20k. a view of main platforms with a train in the station.

This rapid survey of locomotive stamp designs does not approach within measurable distance of exhausting the possibilities. There is a vast amount of interesting material available for the collector who cares to take up this topic as a specialist subject, and we can promise him a thoroughly fascinating task if he attempts to compile a complete collection.



We thank David Field Ltd., 7, Vigo St., London W.1, for their courtesy in loaning the stamps from which the illustrations for our stamp pages have been made.

New Collectors' Corner

More Currency Notes

We give here a further series of explanations of currencies marked on foreign stamps. The stamps of Brazil often cause a little wonder because certain values seem high. This is only apparent, for in Brazilian currency one milreis (m.) consists of 1,000 reis (r.), and at present the milreis is nominally worth only 3d. Argentine stamps are usually denominated in centavos (c.), 100 of which make a peso (p.), sometimes referred to as a dollar. Ecuador also uses the centavo, 100 in this case making a sucre (s.).

Crossing the Pacific we find that China uses a dollar ($) of 100 cents (c.), while Japan employs the yen (y.) divided into 100 sen (s.). Russia's rouble (r.) is divided into 100 kopecs (k.). Turkey uses paras (p.) 40 of which make a kurus (k.). Poland employs 100 grosz (gr.) to the zloty (z.).

A further series of these notes will be given in our next issue.

Mounting Covers

Many collectors nowadays collect complete covers. They claim that the complete article with its postmarks intact is a far more interesting specimen than the simple used stamps. In this we think they are right, but some of them are a little uncertain as the best method of mounting covers in their albums. Complete envelopes can be very awkward.

The problem resolves itself into a consideration of the amount of space that the collector can afford to devote to each cover, and of the individual interest attaching to each specimen. As a general rule, if space is not limited we would suggest only one or two covers to the page. In this way, the whole of the cover can be displayed. If, on the other hand, space is limited, then three or more covers to the page should be the rule.

The method of fixing to the page is simple. Ordinary stamp mounts will do, but it must be remembered that a cover is a comparatively heavy object to anchor to the page. Usually more than one mount will be required and those used should be arranged along the underside of the upper part of the cover. Then it will be possible to turn the cover over for ready inspection.

Another method is to use transparent corner mounts. These provide a firmer anchorage because each corner of the cover is held. Yet the whole envelope can be removed from the album for inspection. Corner mounts cost about 1/– per 100, from almost most stamp dealers.

Collect British Empire Stamps

Many of our readers, faced with appeals to cut out unnecessary spending to help the nation's war effort, are wondering whether it is unpatriotic to continue to buy stamps. In our view it would be a mistake to abandon the hobby, even temporarily. Stamps can do a lot to help to ease the nervous strain of wartime, and there is one way in which stamp collectors can actually help the Empire, while continuing to collect stamps. This is by confining their purchases to current mint issues of the British Empire.

As one leading stamp expert recently put it, such stamps "pay high dividends of pleasure, but do not cost the Empire anything for interest or redemption."

COMPETITIONS! OPEN TO ALL READERS

An Engineering Joke or Story

We have all heard of the lady who gazed wonderingly at the steel girder framework of a huge building in course of erection, and finally decided that what she saw was a monument to Mr. Meccano. This story is only one of many in which Meccano figures, and as another example we may remind readers of the man who applied for work in an aircraft factory, explaining that although he had no experience of aircraft work he was red hot on Meccano!

We have decided to base our main competition this month on the humorous side of engineering in general. The two stories we have given are examples of engineering jokes or stories that we ask competitors to submit in this contest. It is not essential that Meccano should figure in these yarns. All that is wanted is an engineering flavour of some kind. A suitable story of the kind we have in mind is that of the nervous old lady who called her grandson, aged five, away from the giant 4–8–4 locomotive before he broke something on it. Our readers must know many engineering stories that are even better than those we have given, and it will be great fun for them to write out their yarns and to submit them. Stories may be of any length up to 150 words, and the judges will decide on humour and originality.

The prizes will consist of Meccano products to be chosen by the winners from the current catalogues to the value of 21/–, 15/–, 10/6 and 5/–. In addition there will be a number of consolation prizes to be awarded to the next best entries. Competitors may submit as many entries as they wish, but no competitor may receive more than one prize.

Entries should be addressed "*Engineering Story Contest*," Meccano Magazine, Binns Road, Liverpool 13, and must reach this office not later than 30th September.

A separate set of prizes will be reserved for competition amongst Overseas readers, whose entries must arrive not later than 31st December.

The Editor reserves the right to publish any prize-winning story without further fee and will make suitable acknowledgment of any others used.

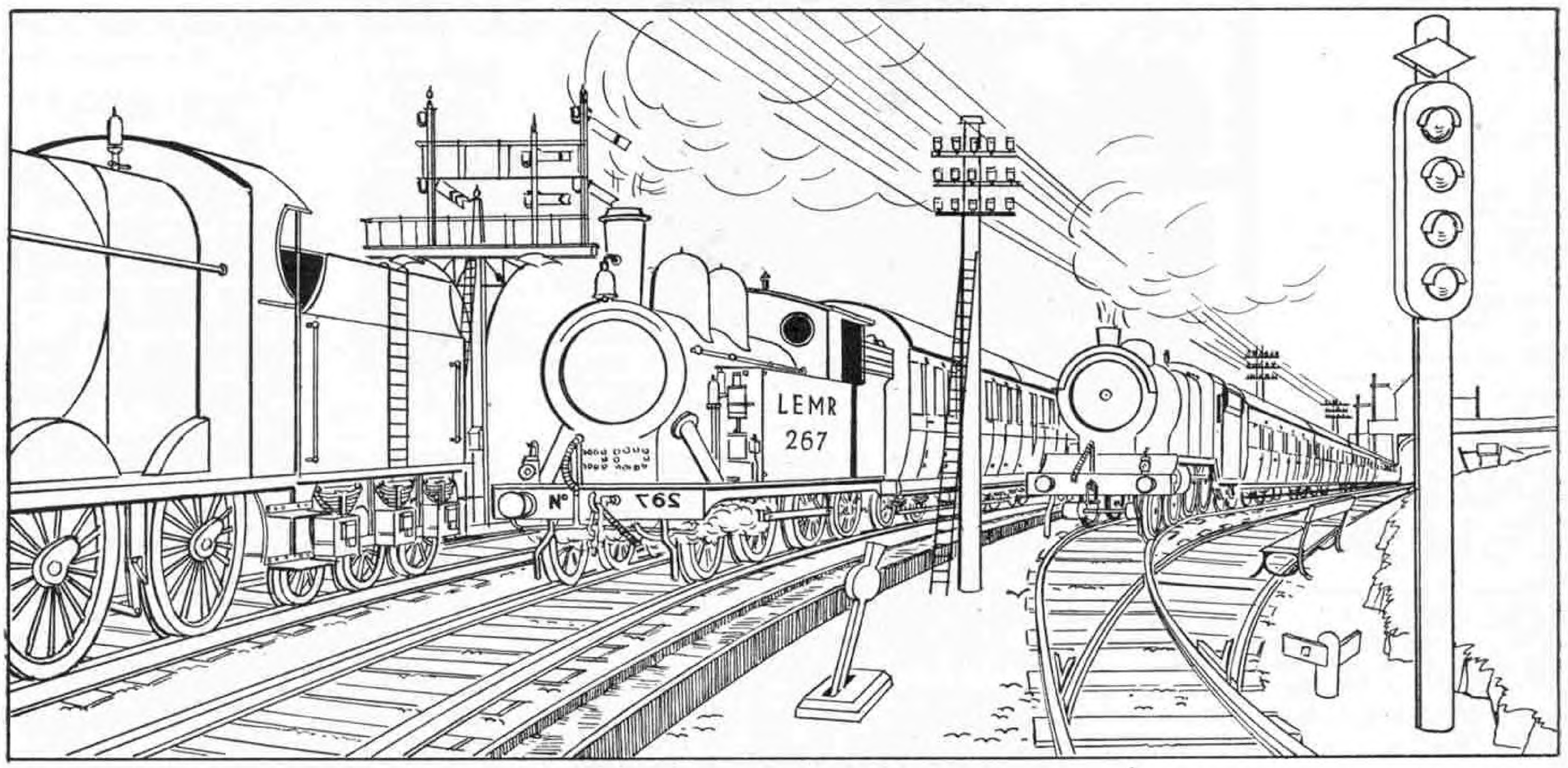
"Meccano Magazine" Word-Building Contest

This is a simple and interesting competition in which all "*M.M.*" readers will wish to enter. There is no age limit, and all that competitors are required to do is to make as many different words as they can out of the letters contained in the words "*Meccano Magazine.*" Only words found in any good English dictionary may be used and each letter may be used in any one word only so many times as it appears in the two words. For example a word may contain two "C's" but only one letter "G."

Prizes of Meccano products to the value of 21/–, 15/–, 10/6 and 5/– respectively will be awarded to the four readers who succeed in making up the highest numbers of words, and in the event of a tie preference will be given the entry most neatly prepared.

Envelopes containing entries must be marked "*Meccano Magazine Word-Building Contest*" in the top left-hand corner, and must be posted in time to reach Meccano Ltd., Binns Road, Liverpool 13, on or before 30th September.

HORNBY RAILWAY CONTESTS



"Spot the Errors" Contest

Our main Railway Contest this month is one that should appeal to all "*M.M.*" readers. Our artist has drawn a railway scene that includes a varied number of mistakes. This drawing is here reproduced. Competitors are asked to spot the mistakes, and prizes will be awarded to those sending in the most complete lists.

Entries should be addressed "*Railway Errors Contest*," Meccano Magazine, Binns Road, Liverpool 13, and on the back of each list the sender's name, address and age must be written.

Every reader of the "*M.M.*" can enter this contest, which will be divided into separate sections for Home and Overseas readers. In each section the prizes will consist of any products manufactured by Meccano Ltd. to the values of 21/–, 15/– and 10/6 respectively. Entries in the Home section must reach us on or before 30th September, and the closing date for Overseas entries is 31st December.

Autumn Drawing Contest

Drawings submitted for this contest, which is open to all readers of the "*M.M.*," must be of a locomotive or general railway scene. They may be in colour, pencil or pen and ink, and entries will be judged solely on drawing merits, so that all will have a fair chance. The name, address and age of the sender must appear on the drawing.

There will be the usual two sections, Home and Overseas, and in each prizes of Meccano products to the value of 21/–, 15/– and 10/6 will be awarded. Envelopes containing entries should be addressed "*Autumn Railway Drawing Contest*," Meccano Magazine, Binns Road, Liverpool, and must be posted to reach Headquarters, not later than 30th September in the Home section, and 31st December in the Overseas section.

FIRESIDE FUN

AT CROSS-PURPOSES

"Prisoner, the jury finds you guilty."

"That's all right, Judge. I know you're too intelligent to be influenced by what they say."

* * * *

Pat was given a free ticket for the pictures. Puzzled about the words "Not transferable" on the back, he asked Mick what they meant.

Mick, with superior knowledge, explained: "It means that if you don't go yourself ye can't get in."

* * * *

The school children had just returned from their summer holidays, and one of the first tasks was to write an essay on their experiences.

To her great surprise, the teacher found that one boy had spelt a difficult name like Aberystwyth correctly. She called him in front of the class and said, "Now, Tommy, spell Aberystwyth."

"I can't, said Tommy.

"But you've written it in your essay," she protested.

"I know," said Tommy, "but I've eaten my rock now."

* * * *

"If you elect me" said the candidate answering a woman heckler, "your husband will have more work."

"Are you sure?" the woman asked.

"Yes, quite sure. What is your husband?" asked the candidate.

"An undertaker."

* * * *

Old Lady: "And what do you do with the submarines when you capture them?"

Naval Officer: "Oh, we keep the big ones and throw the little ones back."

* * * *

Bill had got a job as collector for a gas company.

"Take this master key and go round and empty all the coin boxes; get all the pennies and shillings," said the manager.

Three weeks later Bill walked into the office. "Can I have another key? I've lost t'other one."

"Certainly," replied the manager. "But where have you been all this time? The cashier has stopped late every Friday night, expecting you to come for your wages."

"Great guns!" exclaimed Bill, beaming broadly. "Do I get wages as well?"

* * * *

Teacher: "Who is the laziest boy in the class, Smith?"

Smith: "I don't know, sir."

Teacher (persisting): "Who sits idly in his seat watching the others industriously writing or studying their lessons, instead of working himself?"

Smith (brightly): "Why, you, sir!"

* * * *

Jim: "Aren't you bothered about that five shillings you owe me?"

Tim: "Gosh, no! What's the use of us both worrying?"

* * * *

DOUBTFUL ENCOURAGEMENT



"I shall never do anything better than that!" remarked the artist, finishing his masterpiece.

"Oh, come now!" said his friend, "Don't lose heart."

NOT GUILTY

A man was being tried for stealing a pig, and a witness, to whom the accused was said to have confided, was being examined.

Counsel: "Can you repeat the exact words in which the prisoner confessed taking the pig?"

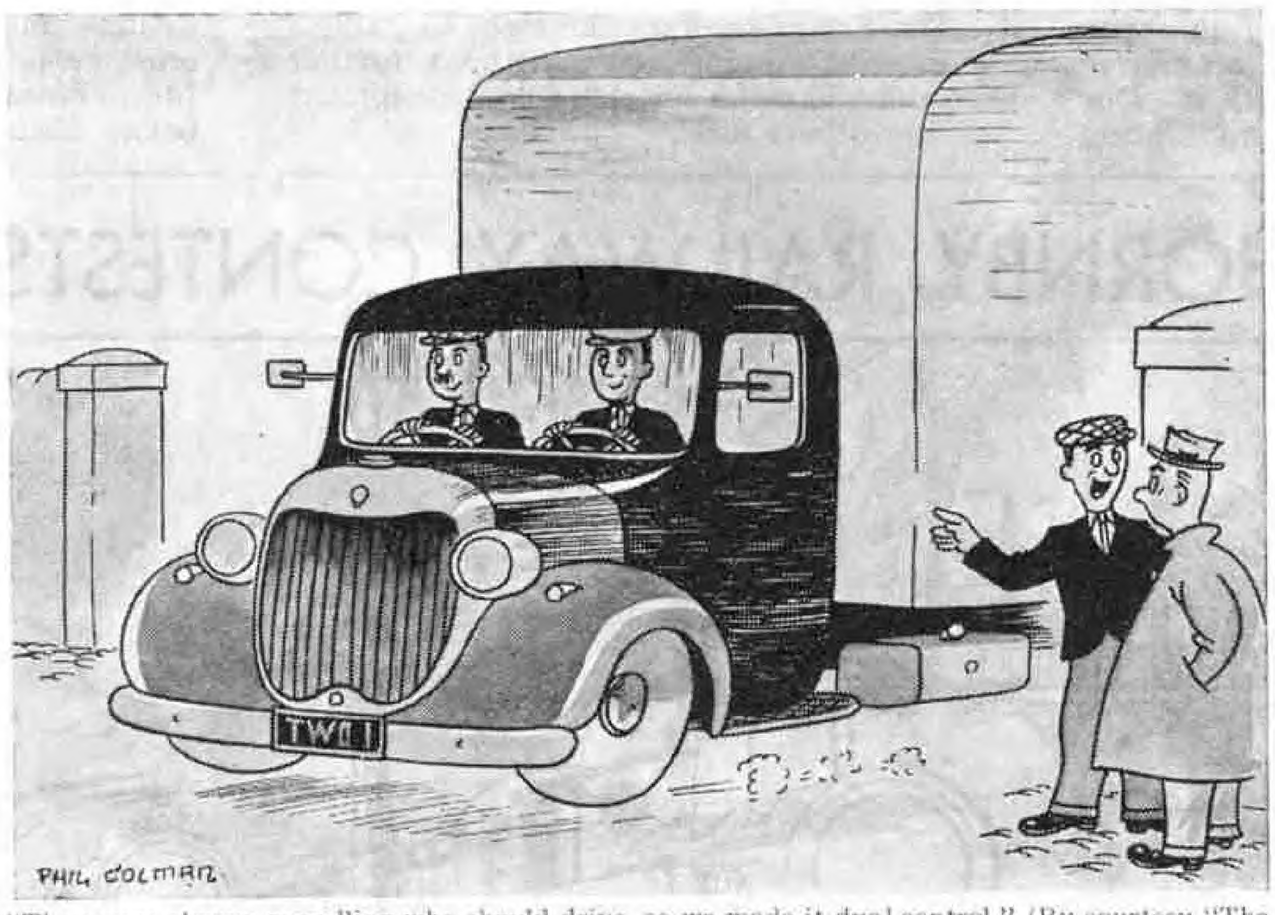
Witness: "He said, sir, he took the pig."

Judge (trying to simplify the question): "Did the prisoner say, 'he took the pig' or 'I took the pig'?"

Witness (shocked): "Oh, Your Honour, he said he took it. Your Honour's name wasn't even mentioned."

* * * *

BOTH SATISFIED



"They were always quarelling who should drive, so we made it dual control." (By courtesy "The Commercial Motor.")

A golfer drove too soon from the tee, while a bow-legged player in front was still playing his second shot. The drive passed between the latter's legs.

"Sir," bellowed the aggrieved player, when the other came up, "that's not golf!"

"I know," was the reply; "but it's jolly fine croquet."

* * * *

Visitor: "What nice buttons you are sewing on your little boy's suit. My husband once had some like that on his suit."

Pastor's Wife: "Yes, I get all my buttons from the collection plate."

* * * *

"My friends," said a preacher, "you will remember that I promised to speak to you tonight on 'The World's Greatest Liars,' and that I asked you to prepare your minds by reading the 17th chapter of St. Mark. Kindly raise your hands if you have done so."

Every hand went up.

"Thank you," continued the preacher. "As there are only 16 chapters in St. Mark, my subject will not be entirely inappropriate."

* * * *

Wife: "Don't you think I have put too much salt in the soup?"

Husband: "Not at all. There is perhaps not quite enough soup for the salt, that's all."

* * * *

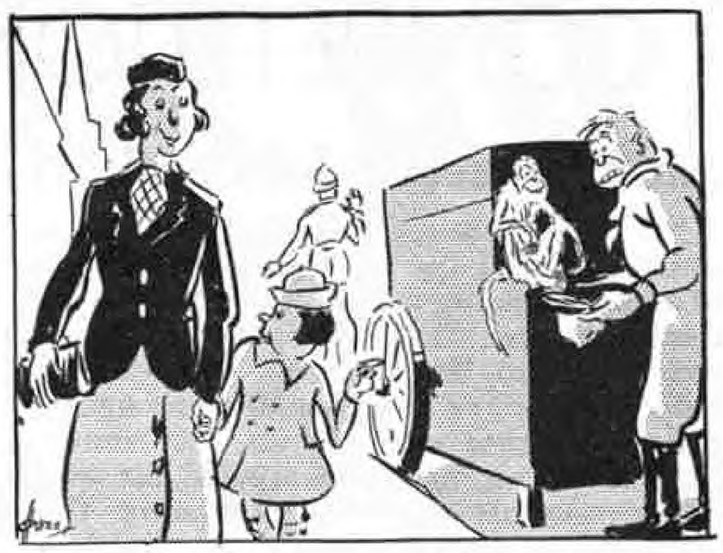
It was necessary for taxation purposes to decide which side of the Canadian and United States border a farm, which an old lady had just purchased, actually lay. Surveyors finally announced that the farm was just on the United States side of the border. The old lady smiled with relief. "I'm so glad to know that" she said. "I've heard that winters in Canada are terribly severe."

* * * *

THIS MONTH'S HOWLER

Cereals are films shown at the pictures.

A FAMILY AFFAIR



"Did you give your penny to the monkey, dear?"
"Yes, Mummy, and he gave it to his father."

* * * *

The prison chaplain was paying his weekly visit to the convicts. In one cell he found a man looking very miserable.

"What's the matter?" he said, sympathetically.

"Bad news from home, sir."

"I'm sorry to hear that. What's the matter?"

"It's me brother, sir. He's gone into the workhouse; the first of our family to disgrace us."

* * * *

Little Betty: "The dentist wasn't painless, mummy."

Mother: "Why, did he hurt you?"

Betty: "No. But I hurt him when I bit his finger."

* * * *

Musketry Sergeant: "Wot the blazes yer tryin' to do? That shot just missed me!"

Recruit: "Sorry, sergeant."

* * * *

"What lovely hair you have, sir, fine as silk" said the talkative barber to his bored client.

"Yes."

"You should put something on it, sir, to preserve it."

"I do, every morning before going out."

"Would it be a great liberty on my part, sir, if I asked what?"

"My hat."

* * * *

Once again the amateur angler had cast his line, and for the tenth time in succession it had landed in a neighbouring gorse bush.

An ancient rustic who had been surveying matters in silence, raised his head solemnly. "I say, young man," he inquired, "be they pikes or spikes you'm after?"

* * * *

"Com - pa - nee atten - shun," bawled the drill sergeant to the awkward squad. "Com-pan-ee, lift up your left leg and hold it straight in front of you."

By mistake, one member held up his right leg, which brought it out side by side with his neighbour's left leg.

"And who is the galoot over there holding up both legs?" shouted the hard-boiled sergeant.

* * * *

Driver (touring abroad): "What's the charge for this battery?"

Mechanic: "Twelve volts, sir."

Driver: "How much is that in American money?"

* * * *

"Halt!" yelled the sergeant to a squad of recruits. But one of them marched on.

"Here, Jones, what were you before you joined the army?" yelled the sergeant.

"A horse driver, sir," replied Jones.

When the squad was marching again the sergeant cried: "Squad, halt! Jones, whoa."

* * * *

Pat: "Ha, ha! I see my pal gave you a black eye."

Mike: "You didn't see the person who did it."

Pat: "He's my friend just the same."

* * * *

Friend: "I hear your son is getting on quite well."

Crabtree: "I'll say so! Two years ago he wore my old suits. Now I wear his."

* * * *

"You've got a touch of pneumonia" said the M.O. after examining the recruit.

"Are you sure, sir," said the recruit. "I have known people in civil life being treated for pneumonia and dying of something else."

"You are not in civil life now; you are in the Army," thundered the M.O., "and if you get treated in the Army for pneumonia you die of pneumonia."

* * * *

Traveller: "When I was in the Sudan, I used to put out a bowl of water for my dog in the morning, and the sun was so hot that by midday it was gone."

Professor: "Due to evaporation, I suppose?"

Traveller: "No, the dog drank it."

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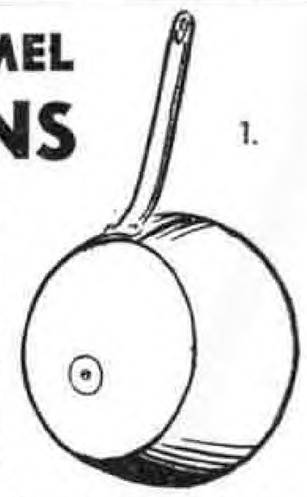
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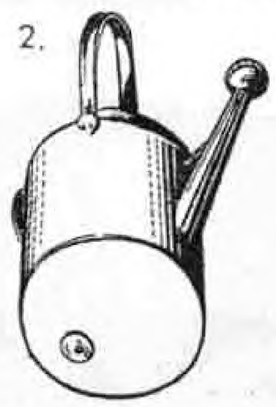


HERE ARE JUST A FEW IDEAS you will easily think of many others

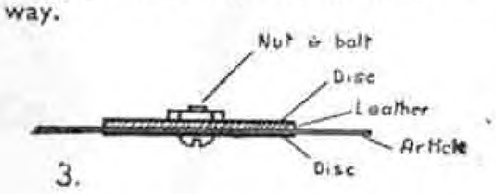
MEND OLD ENAMEL POTS & PANS and send Lord Beaverbrook the aluminium ones!


1.

2.



You can easily repair a hole in a kitchen pot or pan with Juneero as shown in figures (1) and (3). Juneero metal discs, sold in various diameters make excellent washers. A watering can (2) can be repaired in the same way.



3.

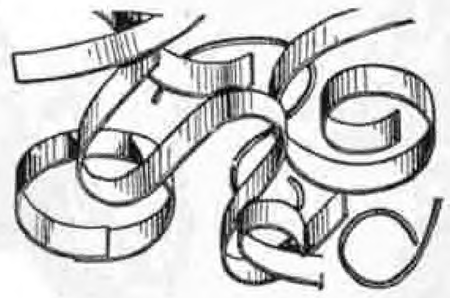

4.


5.

GARDEN TOOLS

Figures (4) and (5) show a neat way of making a metal clip to repair a leaky hose. It is shaped with the scroll tool from a Juneero steel strip. Fig. (6) shows a steel splint you can make to repair the broken shaft of a rake or hoe.


6.



SCROLL WORK

The Juneero Patent Scrool Tool (included in No. 2 Set) enables you to make accurate curves, scrolls and circles from strip or rod. Invaluable where an exact diameter is required in model making or in household repairs.

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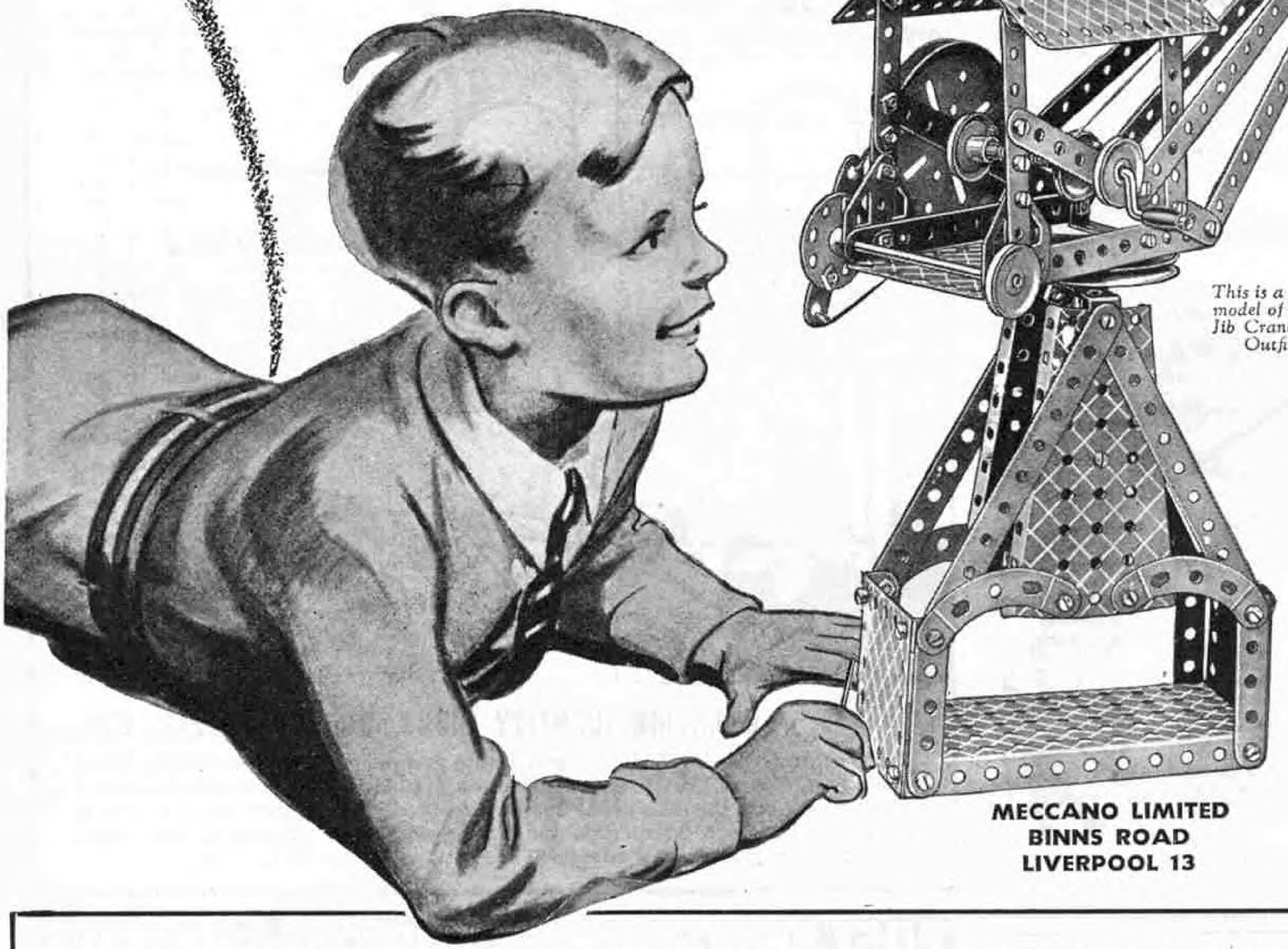
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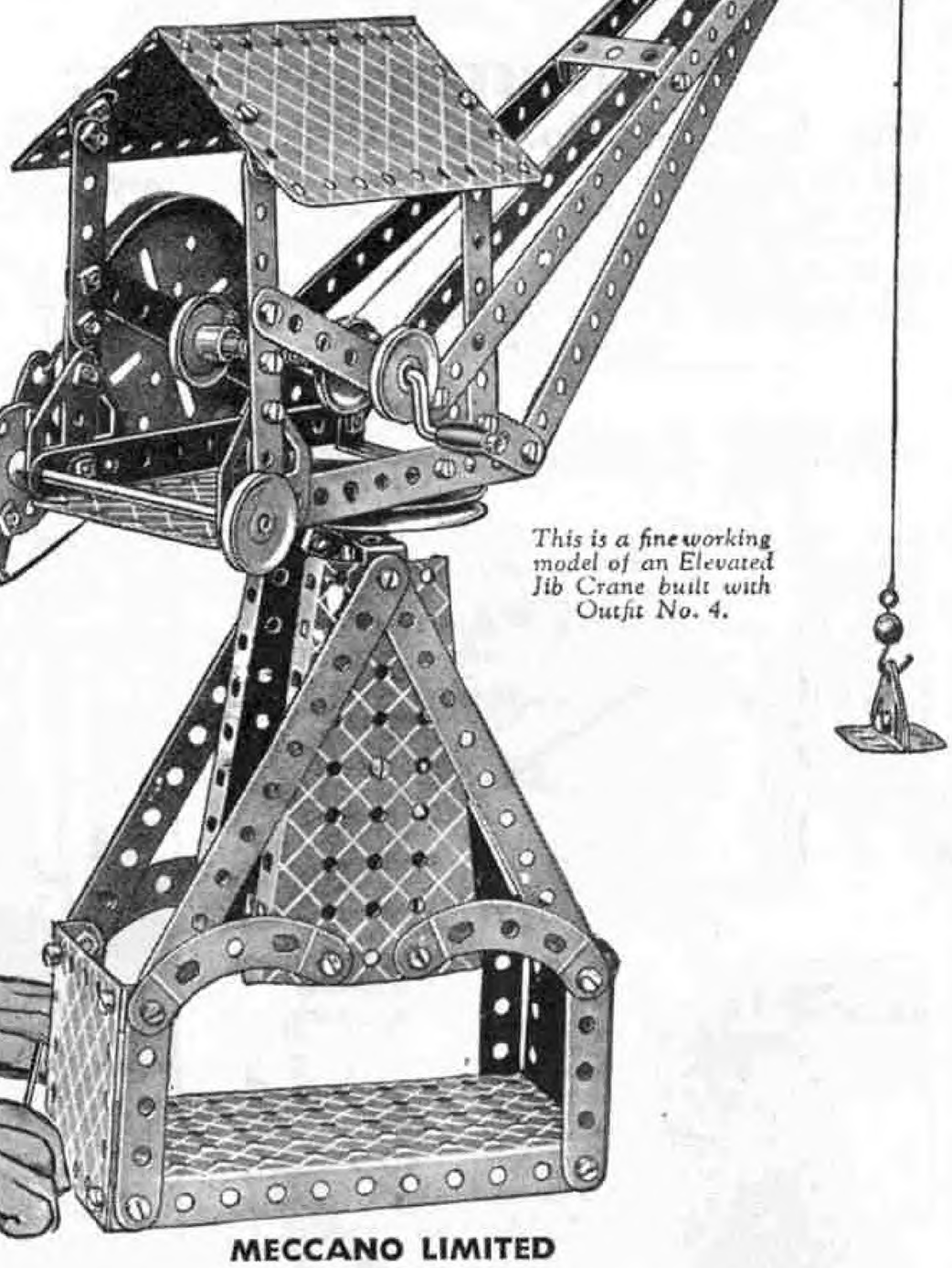
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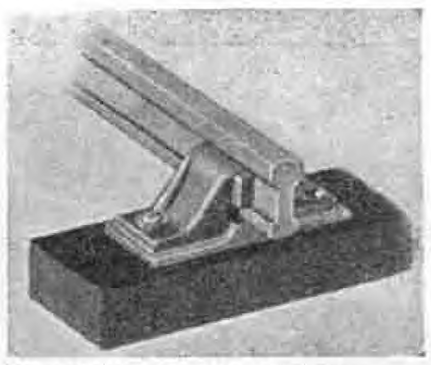
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Binding 6 and 12 copies. These binding cases are supplied so that readers may have their Magazines bound locally, but where desired, the firm mentioned above will bind Meccano Magazines at a charge of 5/9 for six issues or 7/6 for twelve issues, including the cost of the binding and also return carriage. The covers of the Magazines may be included or omitted as required, but in the absence of any instructions to the contrary they will be included.

Whilst the binding of the twelve Magazines is quite satisfactory, they form a rather bulky volume and for that reason arrangements have been made to bind six months' Magazines where so desired, as explained above. Back numbers for any volume can be bound and the case will be embossed with the volume number.

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1. **Mention the "M.M." and any special reference number quoted in the advertisement. This helps the advertisers to give prompt attention.**
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3. **GIVE YOUR FULL ADDRESS.**

THE ADVERTISEMENT MANAGER, MECCANO MAGAZINE, Binns Rd., LIVERPOOL 13.

MECCANO MAGAZINE

Registered at G.P.O., London, for transmission by Canadian Magazine Post.

EDITORIAL AND ADVERTISING OFFICE:—
LIVERPOOL 13, ENGLAND
Telegrams: "Meccano, Liverpool."

Publication Date. The "*M.M.*" is published on the 1st of each month and may be ordered from any Meccano dealer, or from any bookstall or newsagent, price 6d. per copy. It will be mailed direct from this office, 4/- for six issues and 8/- for twelve issues.

To Contributors. The Editor will consider articles and photographs of general interest and payment will be made for those published. Whilst every care will be taken of articles, etc., submitted, the Editor cannot accept responsibility for any loss or damage. A stamped addressed envelope of the requisite size should be sent where the contribution is to be returned if unacceptable.

Readers' Sales and Wants. Private advertisements (i.e., not trade) are charged 1d. per word, minimum 1/-. Cash with order. Editorial and Advertising matters should not be dealt with on the same sheet of paper.

Small Advertisements. 1/6 per line (average seven words to the line), or 16/- per inch (average 12 lines to the inch). Cash with order.

Display. Quotations for space bookings, and latest net sale figures, will be sent on request.

Press Day, etc. Copy should be sent as early in the month as possible for insertion in following issue. We usually close for press on or before 6th of each month for following issue. Half-tone blocks up to 100 screen.

Proofs of advertisements will be sent when possible for space bookings of not less than half-an-inch.

Voucher copies. Sent free to advertisers booking one inch or over. Other advertisers desiring vouchers should add 8d. to their remittance and should order voucher copy at same time.

Remittances. Postal Orders and Cheques should be made payable to Meccano Ltd.

Ordering the "M.M." Overseas

Readers Overseas may order the "*Meccano Magazine*" from regular Meccano dealers or direct from this office. The price and subscription rates are as above, except in Australia, where the price is 1/- per copy (postage extra), and the subscription rates 7/- for six months and 14/- for 12 months (post free), and Canada, where the price is 10c. per copy, and the subscription rates 65c. for six months, and $1.25 for 12 months (post paid).

The U.S.A. price is 15c. per copy, and the subscription rates $1 and $2 for 6 and 12 months respectively (post free).

Overseas readers are reminded that the prices shown throughout the "*M.M.*" are those relating to the United Kingdom and Northern Ireland. Current Overseas Price Lists of Meccano Products will be mailed free on request to any of the undermentioned agencies. Prices of other goods advertised may be obtained direct from the firms concerned.

CANADA: Meccano Ltd., 187-189, Church St., Toronto.
UNITED STATES: Meccano Co. of America Inc., New Haven, Conn., Meccano Co. of America Inc., 200, Fifth Av., New York.
AUSTRALIA: Messrs. E. G. Page & Co., 52, Clarence Street, Sydney, N.S.W.
NEW ZEALAND: Models Limited, Third Floor, Paykel's Buildings, 9, Anzac Avenue (P.O. Box 129), Auckland, C.1.
SOUTH AFRICA: Mr. A. E. Harris (P.O. Box 1199), 142, Market Street, Johannesburg.
INDIA Karachi: Daryanamal & Bros., Elphinstone Street, Bombay: Bombay Sports Depot, Dhobi Talao. Calcutta: Bombay Sports Depot, 2, Lindsay Street. Madras: Bombay Sports Depot, 162, Mount Road.

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*M15a	4½" " "	" 7d.
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M188	Flexible Plates, 2½" × 1½"	doz. 10d.
M189	" " 5½" × 1½"	" 1/6
M190	" " 2½" × 2½"	" 1/3
M190a	" " 3½" × 2½"	" 1/9
M192	" " 5½" × 2½"	" 2/3
M200	Curved Plates, 1 11/16" radius ...	each 1½d.
M212	Rod—Strip Connectors	" 1d.
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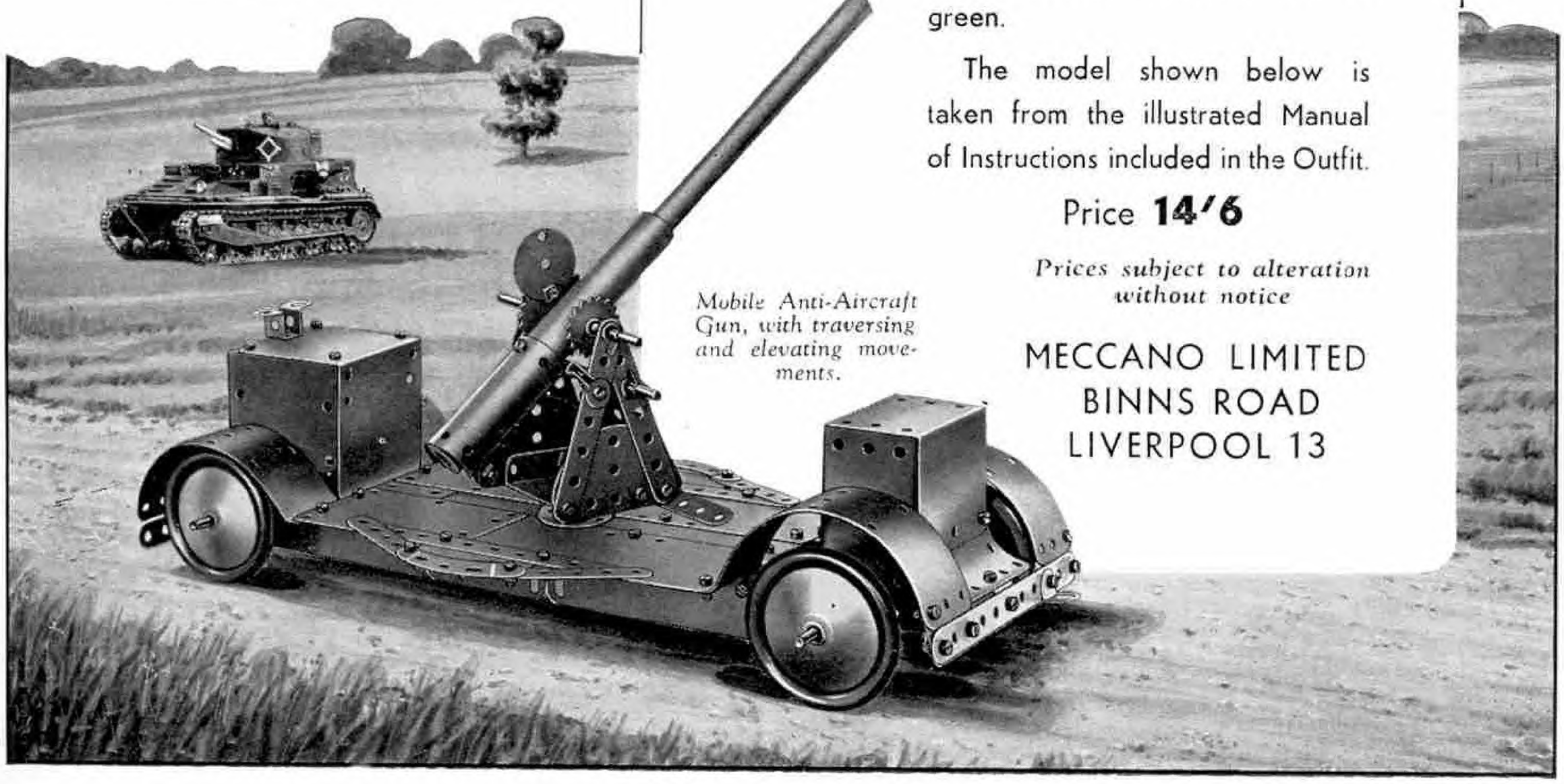
The Outfit consists of a big assortment of specially designed Meccano Parts, including gun barrels, with which realistic models of Tanks, Anti-Aircraft Guns, Field Guns, Transport Lorries, etc., can be built. The parts are finished in the correct shade of Service green.

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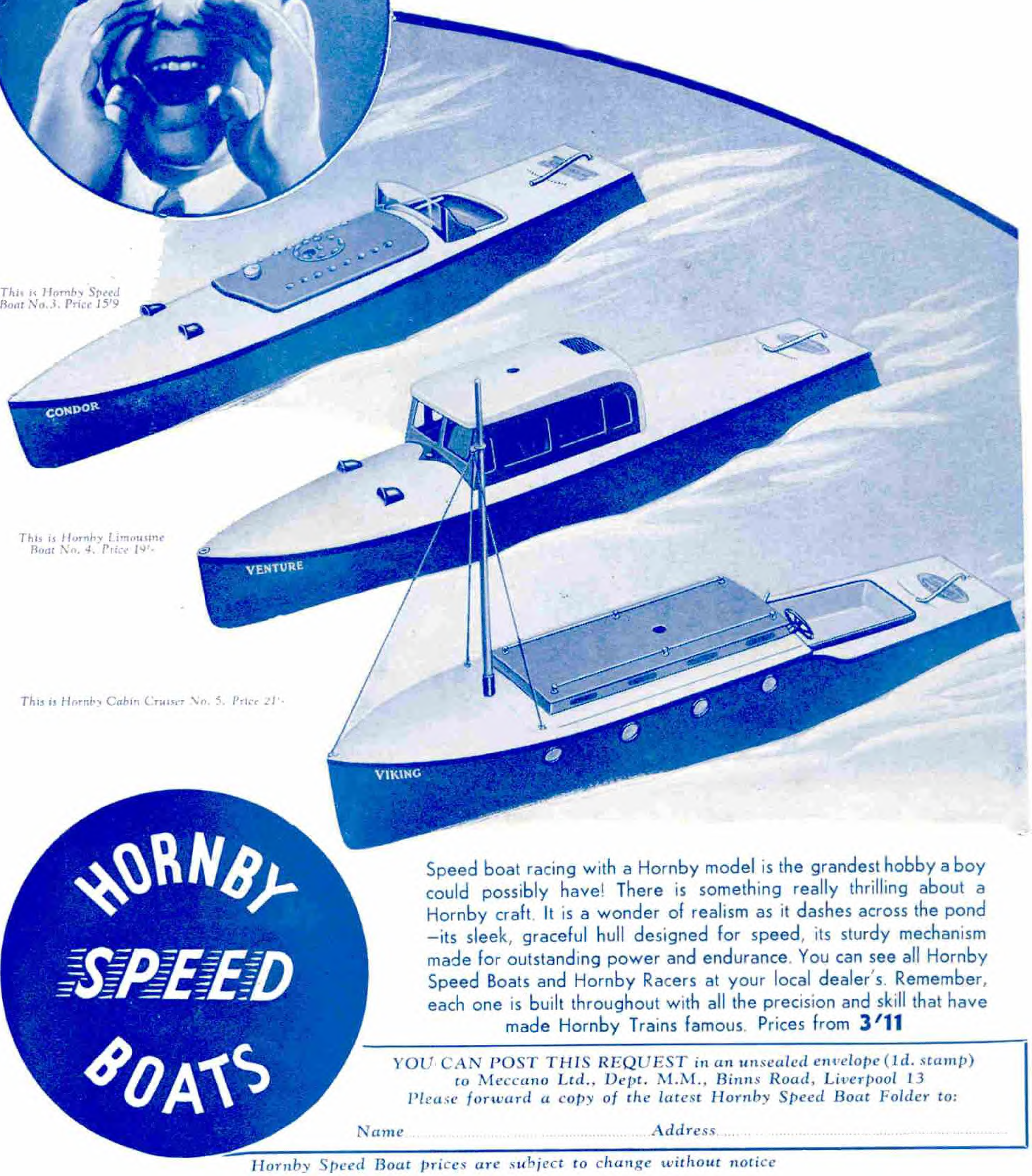
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BINNS ROAD
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Mobile Anti-Aircraft Gun, with traversing and elevating movements.



Boys! Set the pace with a HORNBY SPEED BOAT!



This is Hornby Speed Boat No. 3. Price 15'9

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Please forward a copy of the latest Hornby Speed Boat Folder to:

Name..... *Address*.....

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